Pacific Gas and Electric Company®

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PG&E Letter DCL-09-020

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2
Emergency Plan Implementing Procedure Update

Dear Commissioners and Staff:

In accordance with Section V, "Implementing Procedures," of 10 CFR 50, Appendix E, enclosed are updated Emergency Plan (E-Plan) Implementing Procedures (EPIPs) for Diablo Canyon Power Plant, Units 1 and 2, as indicated in the Enclosure.

As provided under 10 CFR 50.54(q), the changes have been made without prior NRC approval since they do not decrease the effectiveness of the E-Plan. The revised EPIPs continue to meet the requirements of 10 CFR 50.47(b) and 10 CFR 50, Appendix E. The procedure changes are identified by revision bars in the right margin.

This update does not contain privacy/proprietary information in accordance with NRC Generic Letter 81-27. There are no new commitments in this submittal.

If there are questions regarding this update, please contact me at (805) 545-6275.

Sincerely,

Mark S. Persky
Manager – Emergency Services

ddm/1345/50197009
Enclosure
cc: Alan B. Wang, NRC Project Manager
cc/enc: Elmo E. Collins, NRC Region IV
Michael S. Peck, NRC Senior Resident Inspector
Senior Emergency Preparedness Inspector (RGN-IV/DRS)

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NRR

DIABLO CANYON POWER PLANT EMERGENCY PLAN IMPLEMENTING PROCEDURES

Table of Contents - Emergency Plan Implementing Procedures
Volume 1A (OM10.ID1 only), Volume 1B (OM10.DC1 only), and Volume 3B

*** Procedure included in this submittal**

Emergency Classification and Emergency Plan Activation

02/26/09
Effective Date

QUALITY RELATED

Table of Contents

1. SCOPE

1.1 This procedure describes accident classification guidelines and Emergency Plan activation responsibilities.

1.2 This procedure provides guidance for classifying emergency events.

1.2.1 For emergency classification, see Attachment 2, "Emergency Action Level Matrix."

1.2.2 For protective action recommendations, see EP RB-10, "Protective Action Recommendations."

1.2.3 For emergency notifications, see EP G-3, "Emergency Notifications of Off-Site Agencies."

1.2.4 For transition to recovery, see EP OR-3, "Emergency Recovery."

2. DISCUSSION

2.1 The steps required by this procedure are in addition to the steps required to maintain the plant in, or restore the plant to, a safe condition.

2.2 Events not meeting the minimum classification criteria contained in this procedure should be reviewed for reportability in XI1.ID2, "Regulatory Reporting Requirements and Reporting Process."

2.3 Emergency Action Levels (EAL) are the plant-specific indications, conditions or instrument readings that are utilized to classify emergency conditions defined in the DCPP Emergency Plan. EALs are mode applicable based on operating mode definitions.

2.4 Although the majority of the EALs provide very specific thresholds, the ISEC/SEC/RM must remain alert to events or conditions that lead to the conclusion that exceeding the EAL threshold is imminent. If, in the judgement of the ISEC/SEC/RM, based on factual information received from reliable sources, the threshold will be exceeded, then the classification should be made as if the threshold has actually been exceeded.

2.5 Emergency Action Level Wall Charts are provided as job aids in the following locations:

2.5.1 Joint Information Center (JIC)

2.5.2 Emergency Operations Facility (EOF)

2.5.3 Technical Support Center (TSC)

2.5.4 Control Room

2.5.5 Simulator

2.6 Emergency Classification Levels (ECLs)

2.6.1 UNUSUAL EVENT (UE) - Events are in process or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection. No releases of radioactive material requiring off-site response or monitoring are expected unless further degradation of safety systems occurs.

2.6.2 ALERT - Events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of intentional malicious dedicated efforts of a hostile act. Any releases are expected to be limited to small fractions of the Environmental Protection Agency (EPA) Protective Action Guideline exposure levels.

2.6.3 SITE AREA EMERGENCY (SAE) - Events are in process or have occurred which involve an actual or likely major failures of plant functions needed for protection of the public or security events that result in intentional damage or malicious acts; (1) toward site personnel or equipment that could lead to the likely failure of or; (2) prevents effective access to equipment needed for the protection of the public. Any releases are not expected to result in exposure levels which exceed EPA Protective Action Guidelines exposure levels beyond the site boundary.

2.6.4 GENERAL EMERGENCY (GE) - Events are in process or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity or security events that result in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA Protective Action Guidelines exposure levels off-site for more than the immediate site area.

2.7 Additional definitions can be found in Attachment 1 of this procedure.

3. RESPONSIBILITIES

3.1 Interim Site Emergency Coordinator (Interim SEC or ISEC): Control room shift manager is responsible for initial event classification and emergency plan activation. The ISEC may upgrade the event classification until relieved by either the SEC or RM. In addition, the ISEC may downgrade an NUE to no ECL.

3.2 Site Emergency Coordinator (SEC): The SEC may upgrade the classification of an event until relieved by the recovery manager.

3.3 Recovery Manager (RM): The RM, once staffed, is responsible for upgrading or downgrading ECLs, and may direct the SEC to change ECLs.

4. PREREQUISITES

None

5. PRECAUTIONS AND LIMITATIONS

5.1 The expectation is that emergency classifications are to be made as soon as conditions are present and recognizable for the classification, but within 15 minutes or less in all cases of conditions present.

5.2 The plant operating mode that exists at the time that the event occurs (prior to any protective system or operator action is initiated in response to the condition) should be compared to the mode applicability of the EALs. If a lower or higher plant operating mode is reached before the emergency classification is made, the declaration shall be based on the mode that existed at the time the event occurred.

6. INSTRUCTIONS

6.1 Declare an Emergency Classification Level (ECL) by:

> **NOTE:** The expectation is that emergency classifications are to be made as soon as conditions are present and recognizable for the classification, but within 15 minutes or less in all cases of conditions present.

6.1.1 Referring to the appropriate EAL Matrix, EAL Wall Charts, and/or EAL Technical Basis Manual.

6.1.2 Reviewing EALs:

a. Review EAL thresholds from left (highest) to right (lowest).

b. IF an EAL threshold has been exceeded,
THEN:

1. Verify MODE applicability.

2. Note the EAL number.

3. Have the classification independently verified.

4. Make a verbal declaration to the team members using the "Update" method. This constitutes the event declaration time.

6.2 The ISEC or SEC may:

6.2.1 Upgrade the event to a higher ECL until the recovery manager arrives at and assumes responsibility in the EOF. However, the ISEC and SEC shall not downgrade an event classified at the ALERT or higher level at any time. The ISEC may downgrade an NUE to no ECL.

6.2.2 Only the recovery manager may downgrade an ECL at the ALERT or higher level according to the most current controlling EAL.

7. RECORDS

7.1 There are no quality or nonquality records generated by this procedure.

8. REFERENCES

8.1 EP EF-1, "Activation and Operation of the Technical Support Center."

8.2 EP EF-2, "Activation and Operation of the Operational Support Center."

8.3 EP EF-3, "Activation and Operation of the Emergency Operations Facility."

8.4 EP OR-3, "Emergency Recovery."

8.5 EP G-3, "Emergency Notification of Off-Site Agencies."

8.6 Emergency Action Level Technical Basis Manual

Adversary	As applied to security EALs, an armed or suspected-to-be-armed intruder whose intent is to commit sabotage, disrupt station operations or otherwise commit a crime on station property.
Affecting Safe Shutdown	Event in progress has adversely affected functions that are necessary to bring the plant to and maintain it in the applicable HOT or COLD SHUTDOWN condition. Plant condition applicability is determined by Technical Specification Limiting Conditions for Operation (LCOs) in effect. Example 1: Event causes damage that results in entry into an LCO that requires the plant to be placed in HOT SHUTDOWN. HOT SHUTDOWN is achievable, but COLD SHUTDOWN is not. This event is not "AFFECTING SAFE SHUTDOWN." Example 2: Event causes damage that results in entry into an LCO that requires the plant to be placed in COLD SHUTDOWN. HOT SHUTDOWN is achievable, but COLD SHUTDOWN is not. This event is "AFFECTING SAFE SHUTDOWN."
Available	The state or condition of being ready and able to be used (placed into operation) to accomplish the stated (or implied) action or function. As applied to a system, this requires the operability of necessary support systems (electrical power supplies, cooling water, lubrication, etc.).
Bomb	Refers to an explosive device suspected of having sufficient force to damage plant systems or structures.
Civil Disturbance	A group of persons violently protesting station operations or activities at the site.
Close	To position a valve or damper so as to prevent flow of the process fluid. To make an electrical connection to supply power.
Confinement Boundary	The barrier(s) between areas containing radioactive substances and the environment.
Confirm / Confirmation	To validate, through visual observation or physical inspection, that an assumed condition is as expected or required, without taking action to alter the "as found" configuration.
Containment Closure	The procedurally defined action taken to secure containment and its associated structures, systems and components as a functional barrier to fission product release under existing plant conditions. Containment Closure is defined by AD8.DC54, "Containment Closure."
Contiguous	Being in actual contact; touching along a boundary or at a point.
Control	Take action, as necessary, to maintain the value of a specified parameter within applicable limits; to fix or adjust the time, amount, or rate of; to regulate or restrict.

Environment Protection Agency (EPA) Protective Action Guidelines (PAGs)	The EPA PAGs are expressed in terms of dose commitment: 1 Rem TEDE or 5 Rem CDE Thyroid. Actual or projected off-site exposures in excess of the EPA PAGs require DCPP to recommend protective actions for the general public to off-site planning agencies.
Exceeds	To go or be beyond a stated or implied limit, measure, or degree.
Explosion	A rapid, violent, unconfined combustion, or catastrophic failure of pressurized equipment that imparts energy of sufficient force to potentially damage permanent structures, systems, or components.
Extortion	An attempt to cause an action at the station by threat of force.
Faulted	In a steam generator, the existence of secondary side leakage that results in an uncontrolled decrease in steam generator pressure or the steam generator being completely depressurized.
Failure	A state of inability to perform a normal function.
Fire	Combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do not constitute fires. Observation of flame is preferred but is NOT required if large quantities of smoke and heat are observed.
Fission Product Barriers (FPB)	Multiple physical barriers any one of which, if maintained intact, precludes the release of significant amounts of radioactive fission products to the environment. The FPBs are the Reactor Fuel Clad (FC), Reactor Coolant System (RCS) and Containment (CNMT).
Hostage	Person(s) held as leverage against the station to ensure that demands will be met by the station.
Hostile Action	An act toward DCPP or its personnel that includes the use of violent force to destroy equipment, take hostages, and/or intimidate DCPP to achieve an end. This includes attack by air, land, or water using guns, explosives, projectiles, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. Hostile Action should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on DCPP. Non-terrorism-based EALs should be used to address such activities, (e.g., violent acts between individuals in the owner controlled area).
Hostile Force	One or more individuals who are engaged in a determined assault, overtly or by stealth and deception, equipped with suitable weapons capable of killing, maiming, or causing destruction.

IDLH	A condition that either poses an immediate threat to life and health or an immediate threat of severe exposure to contaminants which are likely to have adverse delayed effects on health.
Inoperable	Not able to perform its intended function.
Intruder	Person(s) present in a specified area without authorization.
Intrusion	The act of entering without authorization. Discovery of a bomb in a specified area is indication of intrusion into that area by a hostile force.
Lower Flammability Limit (LFL)	The minimum concentration of a combustible substance that is capable of propagating a flame through a homogenous mixture of the combustible and a gaseous oxidizer.
Maintain	Take action, as necessary, to keep the value of the specified parameter within the applicable limits.
Normal Plant Operations	Activities at the plant site associated with routine testing, maintenance, or equipment operations, in accordance with normal operating or administrative procedures. Entry into abnormal or emergency operating procedures, or deviation from normal security or radiological controls posture, is a departure from Normal Plant Operations.
Operable	Able to perform its intended function.
Owner Controlled Area (OCA)	The land area(s) adjacent to the site boundary that are owned and controlled by the licensee, whereby access can be limited by the licensee for any reason. Generally described, the DCPP OCA is the area between the Port San Luis gate and security gate A, bounded by the eastern hills directly adjacent to the site access road and the northern evacuation route, and bounded to the west by the Pacific Ocean. (Note: for commitments identified in the Diablo Canyon Physical Security Plan, the "Owner Controlled Area" (OCA) is within the "Site Boundary" as described in UFSAR).
Primary System	The pipes, valves, and other equipment which connect directly to the Reactor Vessel or reactor coolant system such that a reduction in Reactor Vessel pressure will effect a decrease in the steam or water being discharged through an unisolated break in the system.
Protected Area	The Protected Area is within the security isolation zone and is depicted in Dwg. 471124 "Plot Plan."
Reduced Inventory Condition (RIC)	The condition existing whenever RCS water level is lower than 3 feet below the Reactor Vessel flange (below 111 foot elevation) with fuel in the core.
Restore	Take the appropriate action required to return the value of an identified parameter to within applicable limits.
Ruptured	In a steam generator, existence of primary-to-secondary leakage of a magnitude sufficient to require or cause a reactor trip and safety injection.

Sabotage	Sabotage is deliberate damage, misalignment, or mis-operation of plant equipment with the intent to render the equipment inoperable. Equipment found tampered with or damaged due to malicious mischief may not meet the definition of Sabotage until this determination is made by security supervision.
Safe Plant Shutdown	Hot or cold shutdown (reactor subcritical) with control of coolant inventory and decay heat removal.
Security Condition	Any Security Event as listed in the approved security contingency plan that constitutes a threat/compromise to site security, threat/risk to site personnel, or a potential degradation to the level of safety of the plant. A Security Condition does not involve a Hostile Action.
Significant Transient	An unplanned event involving any of the following: • Automatic turbine runback > 25% thermal reactor power • Electrical load rejection > 25% full electrical load • Reactor trip • Safety injection activation • Thermal power oscillations > 10%
Site Boundary	As depicted in the Final Safety Analysis Report Update (UFSAR), Figure 2.1-2, Site Plan and Gaseous Effluent Release Points.
Strike Action	Work stoppage within the protected area by a body of organized labor workers to enforce compliance with demands made on DCPP. The strike action must threaten to interrupt normal plant operations.
Sustained	Prolonged. Not intermittent or of a transitory nature.
Trip	To deenergize a pump or fan motor; to position a breaker so as to interrupt or prevent the flow of current in the associated circuit; to manually activate a semi-automatic feature.
Unavailable	Not able to perform its intended function.
Uncontrolled	An evolution lacking control, but is not the result of operator action.
Unplanned	A parameter change or an event that is not the result of an intended evolution and requires corrective or mitigative actions.
Valid	An indication, report, or condition, is considered to be VALID when it is verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to the indicator's operability, the condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

Visible Damage	Damage to equipment or structure that is readily observable without measurements, testing, or analysis. Damage is sufficient to cause concern regarding the continued operability or reliability of affected safety structure, system, or component. Example damage includes: deformation due to heat or impact, denting, penetration, rupture, cracking, paint blistering. Surface blemishes (e.g., paint chipping, scratches) should not be included.
Vital Area	Any plant area which contains vital equipment. Any area, normally within the protected area, which contains equipment, systems, components, or material, the failure, destruction, or release of which could directly or indirectly endanger the public health and safety by exposure to radiation.

Emergency Action Level Matrix

		GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
R **Abnormal Rad Release** **Rad Effluent**	**1** **Offsite Rad Conditions**	Offsite dose resulting from an actual or imminent release of gaseous radioactivity exceeds 1000 mRem TEDE or 5000 mRem thyroid CDE for the actual or projected duration of the release using actual meteorology 1 2 3 4 5 6 DEF **RG1.1** Valid reading on ANY monitors that exceeds or is expected to exceed Table R-1 column "GE" for ≥ 15 min. (Note 1) **Note 1:** If dose assessment results are available at the time of declaration, the classification should be based on dose assessment instead of radiation monitor readings. While necessary declarations should not be delayed awaiting results, the dose assessment should be initiated / completed in order to determine if the classification is warranted. See RG1.2 **RG1.2** Dose assessment using actual meteorology indicates doses > 1,000 mRem TEDE or 5,000 mRem thyroid CDE at or beyond the site boundary **RG1.3** Field survey results indicate closed window dose rates > 1,000 mRem/hr expected to continue for > 1 hr, at or beyond the site boundary **OR** Analyses of field survey samples indicate thyroid CDE of 5,000 mRem for 1 hr of inhalation, at or beyond the site boundary	Offsite dose resulting from an actual or imminent release of gaseous radioactivity exceeds 100 mRem TEDE or 500 mRem thyroid CDE for the actual or projected duration of the release 1 2 3 4 5 6 DEF **RS1.1** Valid reading on ANY radiation monitors that exceeds or is expected to exceed Table R-1 column "SAE" for ≥ 15 min. (Note 1) **Note 1:** If dose assessment results are available at the time of declaration, the classification should be based on dose assessment instead of radiation monitor readings. While necessary declarations should not be delayed awaiting results, the dose assessment should be initiated / completed in order to determine if the classification should be subsequently escalated. See RS1.2 **RS1.2** Dose assessment using actual meteorology indicates doses > 100 mRem TEDE or 500 mRem thyroid CDE at or beyond the site boundary **RS1.3** Field survey indicates closed window dose rate > 100 mRem/hr that is expected to continue for > 1 hr, at or beyond the site boundary **OR** Field survey sample analysis indicates thyroid CDE of ≥ 500 mRem for 1 hr of inhalation at or beyond the site boundary	Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds 200 times the Radiological Effluent Technical Specifications (RETS) limits for 15 minutes or longer 1 2 3 4 5 6 DEF **RA1.1** Valid reading on ANY **LIQUID** monitors > Table R-1 column "Alert" for ≥ 15 min. **RA1.2** Valid reading on ANY **GASEOUS** monitors > Table R-1 column "Alert" for ≥ 15 min. **RA1.3** Confirmed sample analyses for gaseous or liquid releases indicate concentrations or release rates > 200 x RETS limits for ≥ 15 min.	Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds two times the radiological effluent Radiological Effluent Technical Specifications (RETS) limits for 60 minutes or longer 1 2 3 4 5 6 DEF **RU1.1** Valid reading on ANY **LIQUID** monitors > Table R-1 column "UE" for ≥ 60 min. **RU1.2** Valid reading on ANY **GASEOUS** monitors > Table R-1 column "UE" for ≥ 60 min. **RU1.3** Confirmed sample analyses for gaseous or liquid releases indicate concentrations or release rates > 2 x RETS limits for ≥ 60 min.

Category R continued on next page.

Emergency Action Level Matrix

R — Abnormal Rad Release / Rad Effluent

2 — Onffsite Rad Conditions, Spent Fuel Events

GENERAL EMERGENCY

Table R-1 Effluent Monitor Classification Thresholds

Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	Plant Vent	1(2)-RM-14/14R	—	—	Offscale hi	8.0E4 cpm 2.0E-3 µC/cc
		1(2)-RM-24/24R	—	—	1.0E-6 µC/cc	1.0E-8 µC/cc
		1(2)-RM-28/28R	—	—	1.0E-5 µC/cc	1.0E-7 µC/cc
		1(2)-RM-87	3.0E-9 amps 2.0E+1µC/cc	3.0E-10 amps 2.0E0 µC/cc	—	—
	Main Steam	1(2)-RM-71/72/73/74 With Steam Dump or one or more SRVs open on affected SG	3.0E+5 cpm	3.0E+4 cpm	3.0E+3 cpm	3.0E+2 cpm
Liquid	Oily Water Separator Effluent	0-RM-3	—	—	6.0E+4 cpm *	6.0E+2 cpm *
	Liquid Radwaste Discharge Line Effluent	0-RM-18	—	—	Offscale hi *	1.0E+5 cpm *
	SGBD Tank Liquid Effluent	1(2)-RM-23	—	—	Offscale hi *	2.0E+4 cpm *

* With effluent discharge not isolated

SITE AREA EMERGENCY

ALERT

Damage to irradiated fuel or loss of water level that has or will result in the uncovering of irradiated fuel outside the Reactor Vessel

1	2	3	4	5	6	DEF

RA2.1

Damage to irradiated fuel or loss of water level that has or will result in the uncovering of irradiated fuel outside the reactor vessel resulting in a valid high alarm on ANY of the following radiation monitors:

- New Fuel Storage Area Rad Mon RM-59, Hi Rad (6.5 mR/hr)
- Spent Fuel Pool Area Rad Mon RM-58, Hi Rad (20 mR/hr)
- Contmt Area Mon High Rad RM-2, Hi Rad (21 mR/hr)
- Containment Ventilation Exhaust Radiation Monitor RM-44A/B high alarm (1.35E-4 µC/cc)

RA2.2

A water level drop in the reactor refueling cavity, spent fuel pool or fuel transfer canal that will result in irradiated fuel becoming uncovered

Release of radioactive material or increases in radiation levels within the facility that impedes operation of systems required to maintain safe operations or to establish or maintain cold shutdown

1	2	3	4	5	6	DEF

RA2.3

Valid radiation monitor readings > 15 mR/hr in areas requiring continuous occupancy to maintain plant safety functions:

Control Room (0-RM-1)
OR
Central Alarm Station (by survey)

RA2.4

Valid radiation monitor readings > 2 R/hr in the following areas requiring infrequent access to maintain plant safety functions:

- Auxiliary Building
- Fuel Handling Building
- Turbine Building
- Intake Structure

UNUSUAL EVENT

Unexpected increase in plant radiation

1	2	3	4	5	6	DEF

RU2.1

Valid low water level alarm indicating uncontrolled water level decrease in the reactor refueling cavity, spent fuel pool, or fuel transfer canal with all irradiated fuel assemblies remaining covered by water

AND

Unplanned valid direct area radiation monitor reading increases

RU2.2

Unplanned valid direct radiation area monitor reading increases by a factor of 1000 over normal* levels

* Normal levels may be considered as the highest reading in the past twenty-four (24) hours excluding the current peak value

		GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
H **Hazards**	**1** **Natural & Destructive Phenomena**	None	**Table H-1 Vital Areas** • Containment • Auxiliary Building • Fuel Handling Building • Turbine Building • Intake Structure • RWST • CST Note 2: If vehicle crash is a hostile action, see Subcategory H.4 EALs for possible classification	Natural and destructive phenomena affecting the plant Vital Area 1 | 2 | 3 | 4 | 5 | 6 | DEF **HA1.1** EFM "Alert" alarm or CP M-4, "Earthquake" indicates Operating Basis Earthquake (> 0.2 g) exceeded **HA1.2** Tornado or high winds > 80 mph (36.36 m/sec) within Protected Area boundary and resulting in visible damage to ANY Table H-1 plant structures / equipment or Control Room indication of degraded performance of those systems **HA1.3** Vehicle crash within Protected Area boundary and resulting in visible damage to ANY Table H-1 plant structures or equipment or control room indication of degraded performance of those systems (Note 2) **HA1.4** Turbine failure-generated missiles result in ANY visible damage to or penetration of ANY Table H-1 area **HA1.5** Uncontrolled flooding in ANY Table H-1 area that results in degraded safety system performance as indicated in the Control Room or that creates industrial safety hazards (e.g., electric shock) that precludes access necessary to operate or monitor safety equipment	Natural and destructive phenomena affecting the Protected Area 1 | 2 | 3 | 4 | 5 | 6 | DEF **HU1.1** Seismic event identified by ANY TWO of the following: • Earthquake felt in plant • Seismic event confirmed by PK15-24 main annunciator "SEISMIC INSTR SYSTEM" • U.S. Geological Survey (USGS) **HU1.2** Report by plant personnel of tornado or high winds > 80 mph (36.36 m/sec) striking within Protected Area boundary **HU1.3** Report of turbine failure resulting in casing penetration or damage to turbine or generator seals. **HU1.4** Uncontrolled flooding in ANY Table H-1 area that has the potential to affect safety related equipment needed for the current operating mode **HU1.5** Hurricane warning or tsunami (actual or warning) affecting the Protected Area

Category H continued on next page.

Emergency Action Level Matrix

		GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
H **Hazards**	**2** **Fire or Explosion**	None	Note 3: If the fire or explosion is a hostile action, see Subcategory H.4 EALs for possible classification	Fire or explosion affecting the operability of plant safety systems required to establish or maintain safe shutdown. 1 2 3 4 5 6 DEF **HA2.1** Fire or explosion resulting in EITHER: • Visible damage to any Table H-1 plant structures containing safety systems or components • Control Room indication of degraded performance of systems required to establish or maintain safe shutdown (Note 3)	Fire or explosion within the protected area boundary. 1 2 3 4 5 6 DEF **HU2.1** Fire in buildings or areas contiguous to ANY Table H-1 area not extinguished within 15 min. of Control Room notification or validation of a Control Room alarm (Note 3) **HU2.2** Report by plant personnel of an unanticipated explosion within Protected Area boundary resulting in visible damage to permanent structure or equipment (Note 3)
	3 **Toxic and Flammable Gas**	None	None	Release of toxic, corrosive, asphyxiant or flammable gases within or contiguous to a Vital Area which jeopardizes operation of systems required to establish or maintain safe shutdown 1 2 3 4 5 6 DEF **HA3.1** Report or detection of toxic, corrosive or asphyxiant gases within or contiguous to ANY Table H-1 area in concentrations that may result in an atmosphere Immediately Dangerous to Life and Health (IDLH)) **HA3.2** Report or detection of gases in concentration > the Lower Flammability Limit within or contiguous to ANY Table H-1 area	Release of toxic, corrosive, asphyxiant or flammable gases deemed detrimental to normal operation of the plant 1 2 3 4 5 6 DEF **HU3.1** Report or detection of toxic, corrosive, asphyxiant or flammable gases that have entered or could enter the Owner Controlled Area in amounts that can adversely affect normal plant operations **HU3.2** Recommendation by local, county or state officials to evacuate or shelter site personnel based on offsite event

Category H continued on next page.

Emergency Action Level Matrix

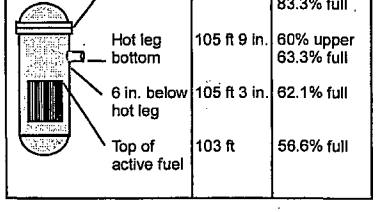
		GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
H Hazards	**4** Security	Hostile action resulting in loss of physical control of the facility 1 2 3 4 5 6 DEF **HG4.1** A hostile action has occurred such that plant personnel are unable to operate equipment required to maintain safety functions **OR** A hostile action has caused: Failure of Spent Fuel Cooling systems **AND** Imminent fuel damage is likely for a freshly off-loaded reactor core in pool	Hostile action within the Protected Area 1 2 3 4 5 6 DEF **HS4.1** A hostile action is occurring or has occurred within the Protected Area as reported by the Security Watch Commander	Hostile action within the Owner Controlled Area or airborne attack threat 1 2 3 4 5 6 DEF **HA4.1** A hostile action is occurring or has occurred within the Owner Controlled Area as reported by the Security Watch Commander **OR** A valid notification from NRC of an airliner attack threat within 30 min. of the site	Confirmed security condition or threat which indicates a potential degradation in the level of safety of the plant 1 2 3 4 5 6 DEF **HU4.1** A security condition that does not involve a hostile action as reported by the Security Watch Commander **OR** A credible site-specific security threat notification **OR** A valid notification from NRC providing information of an aircraft threat
	5 Control Room Evacuation	None	Control Room evacuation has been initiated and plant control cannot be established 1 2 3 4 5 6 DEF **HS5.1** Control Room evacuation has been initiated **AND** Control of the plant cannot be established per OP AP-8A, Control Room Inaccessibility, within 15 min.	Control Room evacuation has been initiated 1 2 3 4 5 6 DEF **HA5.1** Entry into OP AP-8A, Control Room Inaccessibility, for Control Room evacuation	None
	6 Judgment	Other conditions existing which in the judgment of the ISEC/SEC/RM warrant declaration of General Emergency 1 2 3 4 5 6 DEF **HG6.1** Other conditions exist which in the judgment of the ISEC/SEC/RM indicate that events are in process or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity or security events that result in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels (1 Rem TEDE and 5 Rem thyroid CDE) offsite for more than the site boundary	Other conditions existing which in the judgment of the ISEC/SEC/RM warrant declaration of Site Area Emergency 1 2 3 4 5 6 DEF **HS6.1** Other conditions exist which in the judgment of the ISEC/SEC/RM indicate that events are in progress or have occurred which involve an actual or likely major failures of plant functions needed for protection of the public. ANY releases are not expected to result in exposure levels which exceed EPA Protective Action Guideline exposure levels (1 Rem TEDE and 5 Rem thyroid CDE) beyond the site boundary	Other conditions existing which in the judgment of the ISEC/SEC/RM warrant declaration of an Alert 1 2 3 4 5 6 DEF **HA6.1** Other conditions exist which in the judgment of the ISEC/SEC/RM indicate that are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant. ANY releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels (1 Rem TEDE and 5 Rem thyroid CDE)	Other conditions existing which in the judgment of the ISEC/SEC/RM warrant declaration of a UE 1 2 3 4 5 6 DEF **HU6.1** Other conditions exist which in the judgment of the ISEC/SEC/RM indicate that events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs

Emergency Action Level Matrix

		GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
C **Cold SD/ Refuel System Malf.**	**1** **Loss of Power**	None	None	Loss of all offsite power and loss of all onsite AC power to vital buses 5 | 6 | DEF **CA1.1** Loss of ALL offsite and onsite AC power to Unit 1(2) Vital 4kV buses F, G and H for > 15 min.	AC power capability to vital buses reduced to a single power source for greater than 15 minutes such that any additional single failure would result in station blackout 5 | 6 **CU1.1** AC power capability to Unit 1(2) Vital 4kV buses F, G and H reduced to a single power source (e.g., one DG, supply line from unaffected unit or one offsite power source) for > 15 min. such that ANY additional single failure would result in loss of ALL AC power to vital buses Unplanned loss of required DC power for greater than 15 minutes **CU1.2** Unplanned loss of vital DC power to required DC buses based on < 105 VDC bus voltage indications **AND** Failure to restore power to at least one required DC bus within 15 min. from the time of loss

Category C continued on next page.

Emergency Action Level Matrix

<table>
<tr><th colspan="2"></th><th>GENERAL EMERGENCY</th><th>SITE AREA EMERGENCY</th><th>ALERT</th><th>UNUSUAL EVENT</th></tr>
<tr><td rowspan="2">C
Cold SD/ Refuel System Malf</td><td rowspan="2">2
RCS Level</td><td>Loss of Reactor Vessel inventory affecting Fuel Clad integrity with Containment challenged and irradiated fuel in the Reactor Vessel
5 | 6
CG2.1
Containment challenged as indicated by ANY of the following:
• Containment closure <u>not</u> established
• Containment hydrogen concentration > 4%
• Unplanned rise in containment pressure
AND
Core uncovery for > 30 min. as indicated by EITHER:
RVLIS full range < 56.6%
OR
Reactor Vessel level <u>cannot</u> be monitored with core uncovery indicated by ANY of the following:
• Containment radiation (RE-30 or RE-31) > 20 R/hr
• Erratic source range monitor indication
• Unexplained increase in ANY Table C-1 sump/tank level</td><td>Loss of Reactor Vessel inventory affecting core decay heat removal capability
5
CS2.1
With Containment closure <u>not</u> established:
RVLIS full range < 62.1%
OR
Reactor Vessel level <u>cannot</u> be monitored for > 30 min. with unexplained increase in ANY Table C-1 sump/tank level
CS2.2
With Containment closure established:
RVLIS full range < 56.6%
OR
Reactor Vessel level <u>cannot</u> be monitored for > 30 min. with EITHER:
• Unexplained increase in ANY Table C-1 sump/tank level
• Erratic source range monitor indication</td><td>Loss of RCS/RPV inventory with Irradiated fuel in the RPV
5 | 6
CA2.1
Loss of inventory as indicated by EITHER:
Reactor Vessel level < bottom of the RCS hot leg as indicated by ANY of the following:
• RVRLIS, LI-400 standpipe or ultrasonic sensor ≤ 105 ft. 9 in.
• RVLIS upper range < 60%
• RVLIS full range < 63.3%
OR
Reactor Vessel level <u>cannot</u> be monitored for > 15 min. with unexplained increase in ANY Table C-1 sump/tank level
Reactor Vessel Level Thresholds
 

<table><tr><th></th><th><u>Elev.</u></th><th><u>RVLIS</u></th></tr><tr><td>RV flange</td><td>114 ft</td><td>81.5% upper
83.3% full</td></tr><tr><td>Hot leg bottom</td><td>105 ft 9 in.</td><td>60% upper
63.3% full</td></tr><tr><td>6 in. below hot leg</td><td>105 ft 3 in.</td><td>62.1% full</td></tr><tr><td>Top of active fuel</td><td>103 ft</td><td>56.6% full</td></tr></table></td><td>Unplanned loss of RCS inventory with irradiated fuel in the Reactor Vessel
6
CU2.1
Unplanned RCS level decreasing below the Reactor Vessel flange for ≥ 15 min.
CU2.2
Loss of inventory as indicated by unexplained increase in ANY Table C-1 sump/tank level
AND
Reactor Vessel water level <u>cannot</u> be monitored</td></tr>
<tr><td colspan="2">Table C-1 Sumps/Tanks
• Containment Structure Sump 1-1 (2-1)
• Containment Structure Sump 1-2 (2-2)
• Reactor Cavity Sump
• PRT
• RCDT
• CCW surge tank
• Auxiliary Building sump
• RWST</td><td>Loss of Reactor Vessel inventory affecting core decay heat removal capability with irradiated fuel in the Reactor Vessel
6
CS2.3
With Containment closure <u>not</u> established:
RVLIS full range < 62.1%
OR
Reactor Vessel level <u>cannot</u> be monitored with indication of core uncovery as evidenced by EITHER:
• Containment radiation (RE-30 or RE-31) > 20 R/hr
• Erratic source range monitor indication
CS2.4
With Containment closure established:
RVLIS full range < 56.6%
OR
Reactor Vessel level <u>cannot</u> be monitored with indication of core uncovery as evidenced by EITHER:
• Containment radiation (RE-30 or RE-31) > 20 R/hr
• Erratic source range monitor indication</td><td></td><td></td></tr>
</table>

Emergency Action Level Matrix

		GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
C **Cold SD/ Refuel System Malf.**	**3** **RCS Temp.**	None	None	Inability to maintain plant in cold shutdown with irradiated fuel in the Reactor Vessel 5 6 **CA3.1** An unplanned event results in RCS temperature > 200°F for > Table C-3 duration **OR** RCS pressure increase > 10 psig due to a loss of RCS cooling	Unplanned loss of decay heat removal capability with irradiated fuel in the reactor vessel 5 6 **CU3.1** An unplanned event results in RCS temperature > 200°F **CU3.2** Loss of ALL RCS temperature and Reactor Vessel level indication for > 15 min.
	4 **Comm.**	None	None	None	Unplanned loss of all onsite or offsite communications capabilities 5 6 **CU4.1** Loss of ALL Table C-2 onsite (internal) communications capability affecting the ability to perform routine operations **OR** Loss of ALL Table C-2 offsite (external) communications capability
	5 **RCS Leakage**	None	None	None	**RCS leakage** 5 **CU5.1** Unable to restore or maintain **EITHER** of the following due to RCS leakage for > 15 min.: Pressurizer level > 17% **OR** Above the low end of the target level control band (If pressurizer level was intentionally lowered < 17%)
	6 **Inadvert. Crit.**	None	None	None	**Inadvertent criticality** 5 6 **CU6.1** An unplanned sustained positive startup rate observed on nuclear instrumentation

Category C continued on next page.

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
C **Cold SD/ Refuel System Malf.**				

Table C-2 Communications Systems

System	Onsite (internal)	Offsite (external)
Unit 1, Unit 2 and TSC Radio Consoles	X	X
DCPP Telephone System (PBX)	X	X
Portable radio equipment (handie-talkies)	X	
Operations Radio System	X	X
Security Radio Systems	X	
Central Alarm Station (CAS) and Secondary Alarm Stations (SAS) Consoles	X	X
Fire Radio System	X	
Hot Shutdown Panel Radio Consoles	X	X
Public Address System	X	
NRC FTS		X
Mobile radios	X	
Satellite phones	X	X
Direct line (ATL) to the County and State Office of Emergency Services (OES)		X

Table C-3 RCS Reheat Duration Thresholds

Containment and RCS Barrier Status	Duration
RCS intact (Containment closure N/A)	60 min.*
Containment closure established **AND** RCS not intact	20 min.*
Containment closure not established **AND** RCS not intact	0 min.

* If an RCS heat removal system is in operation within this time frame and RCS temperature is being reduced, this EAL is not applicable.

Emergency Action Level Matrix

		GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
S System Malf.	**1** Loss of Power	Prolonged loss of all offsite power and prolonged loss of all onsite AC power to vital buses 1 2 3 4 **SG1.1** Loss of ALL offsite and onsite AC power to Unit 1(2) Vital 4kV buses F, G and H **AND EITHER:** Restoration of ANY Vital 4kV bus within 4 hours is <u>not</u> likely **OR** CSFST Core Cooling-RED or MAGENTA path	Loss of all offsite power and loss of all onsite AC power to vital buses 1 2 3 4 **SS1.1** Loss of ALL offsite and onsite AC power to Unit 1(2) Vital 4kV buses F, G and H for > 15 min. Loss of all vital DC power **SS1.2** Loss of ALL vital DC power based on < 105VDC bus voltage indications for > 15 min.	AC power capability to vital buses reduced to a single power source for greater than 15 minutes such that any additional single failure would result in station blackout. 1 2 3 4 **SA1.1** AC power capability to Unit 1(2) Vital 4kV buses F, G and H reduced to a single power source (i.e., one DG or one offsite power source) for > 15 min.	Loss of all offsite power to vital buses for greater than 15 minutes 1 2 3 4 **SU1.1** Loss of ALL offsite AC power to Unit 1(2) Vital 4kV buses F, G and H for > 15 min.
	2 RTS Failure	Automatic trip and ALL manual actions fail to shut down the reactor and indication of an extreme challenge to the ability to cool the core exists 1 2 **SG2.1** Automatic trip and ALL manual actions fail to shut down the reactor **AND EITHER** of the following have occurred due *to continued power generation:* CSFST Core Cooling-RED **OR** CSFST Heat Sink-RED	Automatic trip fails to shut down the reactor and manual actions taken from the reactor control console are NOT successful in shutting down the reactor 1 2 **SS2.1** An automatic trip failed to shut down the reactor **AND** Manual actions taken at the reactor control console do <u>not</u> shut down the reactor as indicated by reactor power > 5%	Automatic trip fails to shut down the reactor and the manual actions taken from the reactor control console are successful in shutting down the reactor 1 2 **SA2.1** An automatic trip failed to shut down the reactor **AND** Manual actions taken at the reactor control console successfully shut down the reactor as indicated by reactor power < 5%	None
	3 Inability to Reach or *Maintain* SD Cond.	None	None	**None**	**Inability to reach required shutdown within Technical Specification limits** 1 2 3 4 **SU3.1** Plant is <u>not</u> brought to required operating mode within Technical Specifications LCO action statement time

Category S continued on next page.

		GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
	4 **Inst./ Comm.**	**Table C-2 Communications Systems** See table below	Inability to monitor a significant transient in progress 1 2 3 4 **SS4.1** Loss of greater than approximately 75% of the annunciators or indicators associated with safety systems on Vertical Boards 1 through 5, and Control Consoles 1, 2 and 3 **AND** Significant transient is in progress **AND** Compensatory non-alarming indications (PPC, SPDS) are unavailable	Unplanned loss of most or all safety system annunciation or indication in control room with either (1) a significant transient in progress, or (2) compensatory non-alarming indicators are unavailable 1 2 3 4 **SA4.1** Unplanned loss of greater than approximately 75% of the annunciators or indicators associated with safety systems on Vertical Boards 1 through 5, and Control Consoles 1, 2 and 3 for > 15 min. **AND EITHER:** A significant transient is in progress **OR** Compensatory non-alarming indications (PPC, SPDS) are unavailable	Unplanned loss of most or all safety system annunciation or indication in the control room for greater than 15 minutes 1 2 3 4 **SU4.1** Unplanned loss of greater than approximately 75% of the annunciators or indicators associated with safety systems on Vertical Boards 1 through 5, and Control Consoles 1, 2 and 3 for > 15 min. Unplanned loss of all onsite or offsite communications capabilities **SU4.2** Loss of ALL Table C-2 onsite (internal) communications capability affecting the ability to perform routine operations **OR** Loss of ALL Table C-2 offsite (external) communications capability

Table C-2 Communications Systems

System	Onsite (internal)	Offsite (external)
Unit 1, Unit 2 and TSC Radio Consoles	X	X
DCPP Telephone System (PBX)	X	X
Portable radio equipment (handie-talkies)	X	
Operations Radio System	X	X
Security Radio Systems	X	
Central Alarm Station (CAS) and Secondary Alarm Stations (SAS) Consoles	X	X
Fire Radio System	X	
Hot Shutdown Panel Radio Consoles	X	X
Public Address System	X	
NRC FTS		X
Mobile radios	X	
Satellite phones	X	X
Direct line (ATL) to the County and State Office of Emergency Services (OES)		X

Category S continued on next page.

Emergency Action Level Matrix

		GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
S System Malf.	**5** Fuel Clad Degrad.	None	None	None	Fuel Clad degradation 1 2 3 4 **SU5.1** With letdown in service, EP-RB-14A Dose Point radiation > 3 R/hr **SU5.2** Coolant activity > 60 µCi/gm Dose Equivalent I-131 **OR** Coolant activity > 600.0 µCi/gm Dose Equivalent Xe-133
	6 RCS Leakage	None	None	None	RCS leakage 1 2 3 4 **SU6.1** Unidentified or pressure boundary leakage > 10 gpm **OR** Identified leakage > 25 gpm
	7 Inadvert. Crit.	None	None	**None**	**Inadvertent criticality** 3 4 **SU7.1** An unplanned sustained positive startup rate observed on nuclear instrumentation

Emergency Action Level Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
F **Fission Product Barriers**	**FG1.1** 1 2 3 4 Loss of ANY two barriers **AND** Loss or potential loss of third barrier (Table F-1) (Note 5)	**FS1.1** 1 2 3 4 Loss or potential loss of ANY two barriers (Table F-1) (Note 5)	**FA1.1** 1 2 3 4 ANY loss or ANY potential loss of either Fuel Clad or RCS (Table F-1) (Note 5)	**FU1.1** 1 2 3 4 ANY loss or ANY potential loss of Containment (Table F-1) (Note 5)
	Note 5: The logic used for these initiating conditions reflects the following considerations: • The Fuel Clad barrier and the RCS barrier are weighted more heavily than the Containment barrier. UE EALs associated with RCS and Fuel Clad barriers are addressed under System Malfunction EALs. • At the Site Area Emergency level, there must be some ability to dynamically assess how far present conditions are from the threshold for a General Emergency. For example, if Fuel Clad and RCS barrier "loss" EALs existed, that, in addition to offsite dose assessments, would require continual assessments of radioactive inventory and containment integrity. Alternatively, if both Fuel Clad and RCS barrier "Potential Loss" EALs existed, the ISEC/SEC/RM would have more assurance that there was no immediate need to escalate to a General Emergency. • The ability to escalate to higher emergency classes as an event deteriorates must be maintained. For example, RCS leakage steadily increasing would represent an increasing risk to public health and safety.			

Emergency Action Level Matrix

Table F-1 Fission Product Barrier Matrix

	Fuel Cladding Barrier		Reactor Coolant System Barrier		Containment Barrier	
	☐ Loss	☐ Potential Loss	☐ Loss	☐ Potential Loss	☐ Loss	☐ Potential Loss
A.CSFST	☐ 1. CSFST Core Cooling-RED	☐ 1. CSFST Core Cooling-MAGENTA OR CSFST Heat Sink-RED and heat sink required	None	☐ 1. CSFST RCS Integrity-RED OR CSFST Heat Sink-RED and heat sink required	None	☐ 1. CSFST Containment-RED
B.Core Exit TCs	☐ 2. Core exit TCs > 1,200°F	☐ 2. Core exit TCs > 700°F	None	None	None	☐ 2. Core exit TCs > 1,200°F AND Restoration procedures <u>not</u> effective within 15 min. ☐ 3. ALL of the following: - Core exit TCs > 700°F - Reactor Vessel water level < Table F-2 thresholds - Restoration procedures <u>not</u> effective within 15 min.
C.Radiation	☐ 3. Containment radiation (RM-30 or RM-31) > 20 R/hr ☐ 4. With letdown in service, EP-RB-14A Dose Point radiation > 15 R/hr	None	☐ 1. Containment radiation (RM-30 or RM-31) > 6 R/hr	None	None	☐ 4. Containment radiation (RM-30 or RM-31) > 80 R/hr
D.Inventory	☐ 5. SGTR in progress AND MSL radiation (RM-71, 72, 73 or 74) > 5.0E4 cpm (> 5 min. after reactor shutdown)	☐ 3. Reactor Vessel water level < Table F-2 thresholds	☐ 2. RCS leak rate > available makeup capacity as indicated by a loss of RCS subcooling ☐ 3. SGTR that results in an ECCS (SI) actuation	☐ 2. Unisolable RCS leak exceeding the capacity of one charging pump in the normal charging mode (150 gpm)	☐ 1. Rapid unexplained Containment pressure drop following initial increase ☐ 2. Following LOCA, Containment pressure or sump level response <u>not</u> consistent with LOCA conditions ☐ 3. Ruptured S/G is also faulted outside of Containment ☐ 4. Primary-to-secondary leakage > 10 gpm with non-isolable steam release from affected S/G to the environment	☐ 5. Containment pressure 47 psig and increasing ☐ 6. Containment hydrogen concentration > 4% ☐ 7. Containment pressure > 22 psig with < one full train of depressurization equipment operating Note: One Containment Spray pump and two CFCUs comprise one full train of depressurization equipment
E.Other	☐ 6. Coolant activity > 300 µCi/gm Dose Equivalent I-131	None	None	None	☐ 5. Valve(s) <u>not</u> closed AND Direct pathway to the environment exists after Containment isolation signal	None
F. Judgment	☐ 7. ANY condition in the opinion of the ISEC/SEC/RM that indicates loss of the Fuel Clad barrier	☐ 4. ANY condition in the opinion of the ISEC/SEC/RM that indicates potential loss of the Fuel Clad barrier	☐ 4. ANY condition in the opinion of the ISEC/SEC/RM that indicates loss of the RCS barrier	☐ 3. ANY condition in the opinion of the ISEC/SEC/RM that indicates potential loss of the RCS barrier	☐ 6. ANY condition in the opinion of the ISEC/SEC/RM that indicates loss of the Containment barrier	☐ 8. ANY condition in the opinion of the ISEC/SEC/RM that indicates potential loss of the Containment barrier

Table F-2 Reactor Vessel Water Level Thresholds

RVLIS	No. RCPs	Level
Full Range	None	32%
Dynamic Head	4	46%
	3	35%
	2	26%
	1	22%

TITLE: Calculation of Release Rate

1 AND 2

03/13/09
EFFECTIVE DATE

PROCEDURE CLASSIFICATION: QUALITY RELATED

1. SCOPE

1.1 This procedure describes the manual method to determine the release rate of airborne radioactive materials from a plant vent release, main steam line release, or containment leakage.

2. DISCUSSION

2.1 Initial calculations of radiological release rates are performed in the control room in accordance with EP R-2, "Release of Airborne Radioactive Materials" by the emergency evaluation coordinator.

2.2 This procedure provides a manual methodology for performing release rate calculations as a backup to the Emergency Assessment and Response System (EARS) or the Excel application "Quick Dose."

This procedure in conjunction with EP RB-11, "Emergency Off-Site Dose Calculations" can be used to determine projected off-site TEDE and thyroid CDE doses.

3. RESPONSIBILITIES

3.1 Dose assessment personnel perform this procedure when required.

4. INSTRUCTIONS

4.1 To manually calculate Noble Gas and Iodine-131 Equivalent Release Rates for a Plant Vent Release follow the step-by-step instructions given in Attachment 7.1 - Form 69-9260.

4.2 To manually calculate Noble Gas and Iodine-131 Equivalent Release Rates for a Main Steam Line Release follow the step-by-step instructions given in Attachment 7.2 - Form 69-11105.

4.3 To manually calculate Noble Gas and Iodine-131 Equivalent Release Rates for a Containment Leakage Release follow the step-by-step instructions given in Attachment 7.3 - Form 69-10555.

5. RECORDS

All records generated by the utilization of this procedure for an exercise or emergency shall be forwarded the next working day to the supervisor, emergency planning, for review and retention.

6. APPENDICES

- 6.1 Table 1, Source Term For Various Postulated Accidents
- 6.2 Figure 1, Plant Vent Noble Gas Monitor Response RE-14/14R, Normal Range
- 6.3 Figure 2, Plant Vent Noble Gas Monitor Response RE-87, Extended Range
- 6.4 Figure 3, Plant Vent Gross Gamma Monitor Response RE-29, High Range
- 6.5 Figures 4.1, I-131 TEDE Correction Factor, and 4.2, I-131 Thyroid CDE Correction Factor (2 pages)
- 6.6 Figures 5.1, 5.2, and 5.3, Main Steamline Monitor Response RE-71, RE-72, RE-73, RE-74, for Empty, Normal, and Flooded Conditions (3 pages)
- 6.7 Figures 6.1, Iodine TEDE Conversion Factor, and 6.2, Iodine Thyroid CDE Conversion Factor (2 pages)
- 6.8 Figure 7, Design Basis Containment Monitor Exposure Rate RE-30 and RE-31
- 6.9 Figure 8, Design Basis Noble Gas Release Rates
- 6.10 Figure 9, Design Basis I-131 Equivalent Release Rates
- 6.11 Accident Summary Sheets

7. ATTACHMENTS

- 7.1 Form 69-9260, "Noble Gas and I-131 Equivalent Release Rates for a Plant Vent Release," 08/31/94
- 7.2 Form 69-11105, "Noble Gas and I-131 Equivalent Release Rates for a Steam Release," 02/03/09
- 7.3 Form 69-10555, "Noble Gas and I-131 Equivalent Release Rates for Containment Leakage," 08/31/94

8. REFERENCES

- 8.1 EP EF-1, "Activation and Operations of the Technical Support Center"
- 8.2 EP EF-3, "Activation and Operation of the Emergency Operations Facility"
- 8.3 EP EF-6, "Operating Procedures for EARS Stations"
- 8.4 EP G-1, "Accident Classification and Emergency Plan Activation"
- 8.5 EP R-2, "Release of Airborne Radioactive Materials"
- 8.6 EP RB-11, "Emergency Off-site Dose Calculations"
- 8.7 EP RB-12, "Plant Vent Iodine and Particulate Sampling During Accident Conditions"
- 8.8 EP RB-14, "Core Damage Assessment Procedure"
- 8.9 Diablo Canyon Power Plant Unit 1 and 2 Emergency Plan

8.10 PG&E, Nuclear Operations Support Calculation RA-93-04, EP RB-9, Calculation of Release Rate, Units 1 and 2, Rev. 7 - Validation and Verification

8.11 PG&E Calculation PAM-0-04-517, Rev. 4, 4/6/97 "Steam Generator Narrow Range Level Uncertainty"

8.12 SH&ES Calculation No. EP-94-02, Rev 0, Validation and Verification of EP RB-9, "Calculation of Release Rate," Rev 10, and EP RB-11, "Emergency Offsite Dose Calculations," Rev 11

APPENDIX 6.1

Table 1

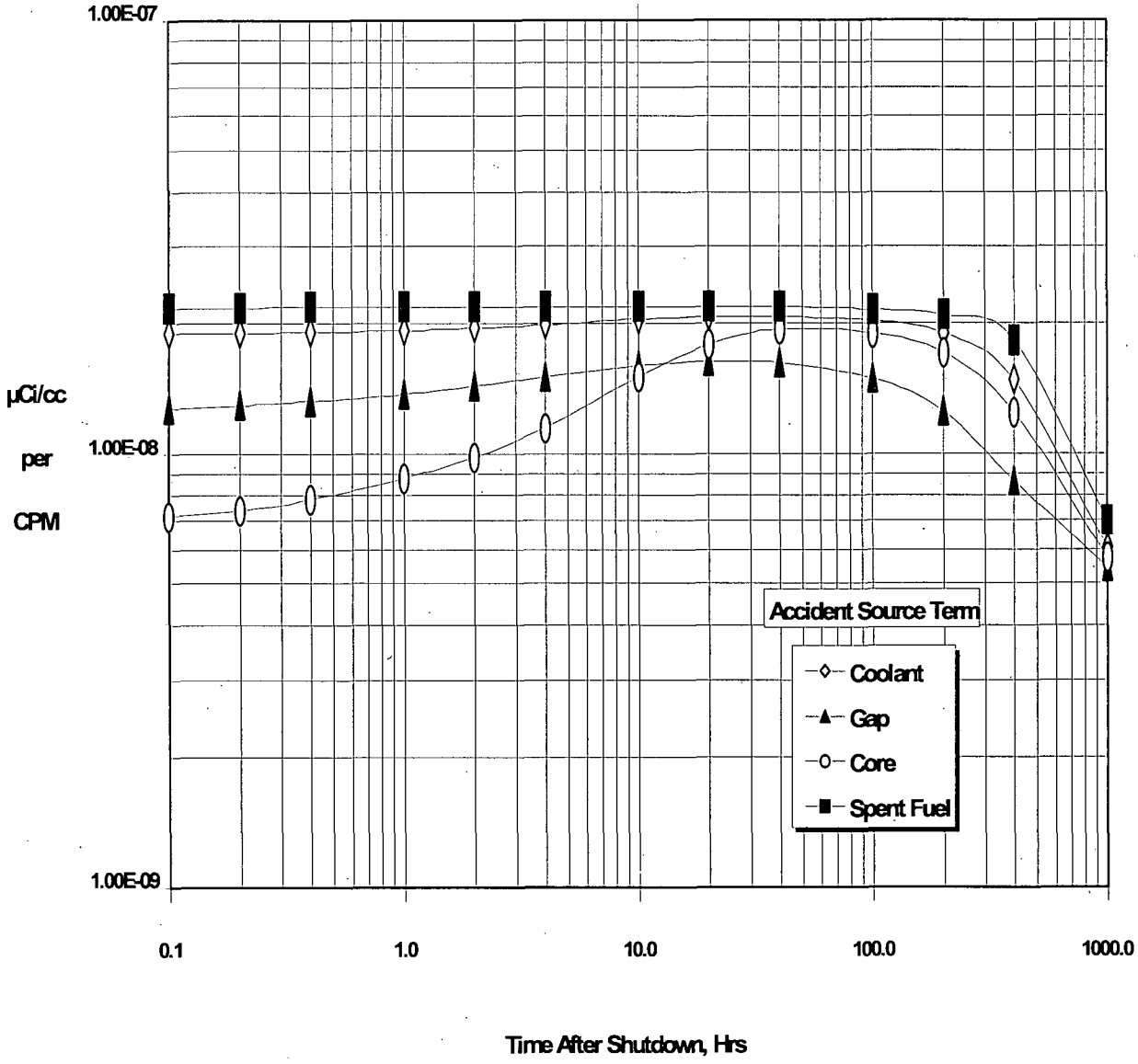
Source Term for Various Postulated Accidents

		Source Term
1.	Major LOCA with Core Melt - RE-30/31 >300R/hr	Core
2.	Major LOCA (Gap Release) - RE-30/31 >1R/hr, <300R/hr	Gap
3.	Small Break LOCA (No fuel damage) - RE-30/31 <1R/hr	RCS
4.	Blackout	RCS
5.	Major Steamline Break	
6.	Major Feedwater Line Break	RCS
7.	Steam Generator Tube Rupture	RCS
8.	Locked Reactor Coolant Pump (RCP Rotor)	GAP
9.	Control Rod Ejection	GAP
10.	Gas Decay Tank Rupture	GAP - Noble Gas Only
11.	Liquid Holdup Tank Rupture	RCS - Noble Gas Only
12.	Volume Control Tank (VCT) Rupture	RCS - Noble Gas Only
13.	Fuel Handling Accident in Fuel Handling Building (FHB)	Spent Fuel (Highest Assembly Gap)

APPENDIX 6.2

Figure 1

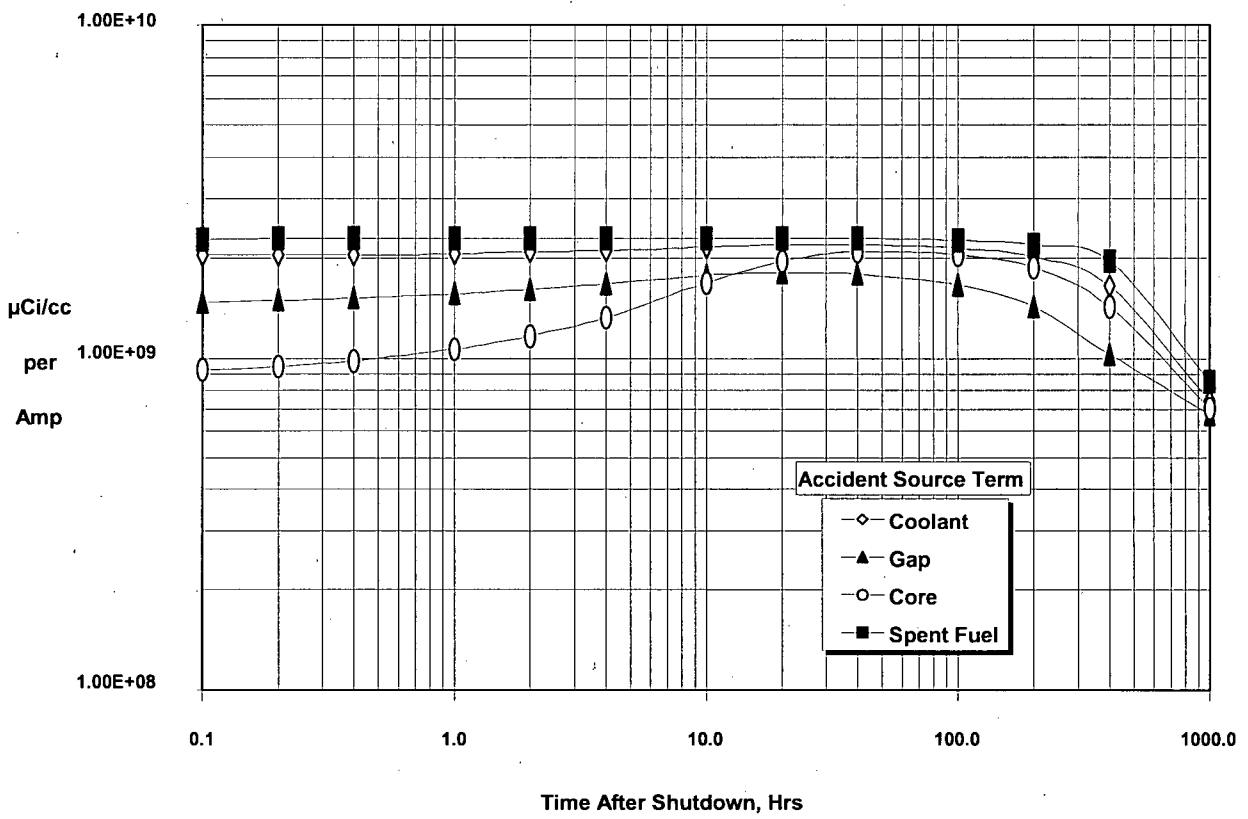
Plant Vent Noble Gas Monitor Response RE-14/14R, Normal Range



APPENDIX 6.3

Figure 2

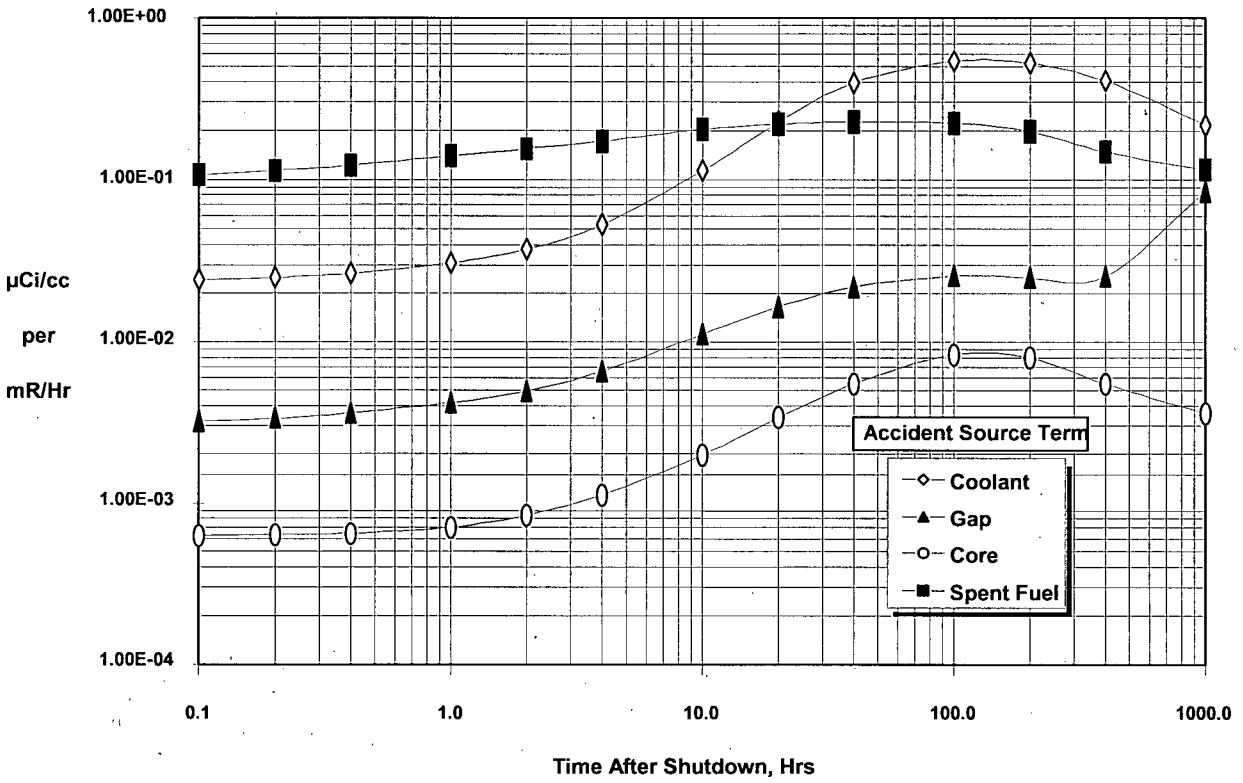
Plant Vent Noble Gas Monitor Response RE-87, Extended Range



APPENDIX 6.4

Figure 3

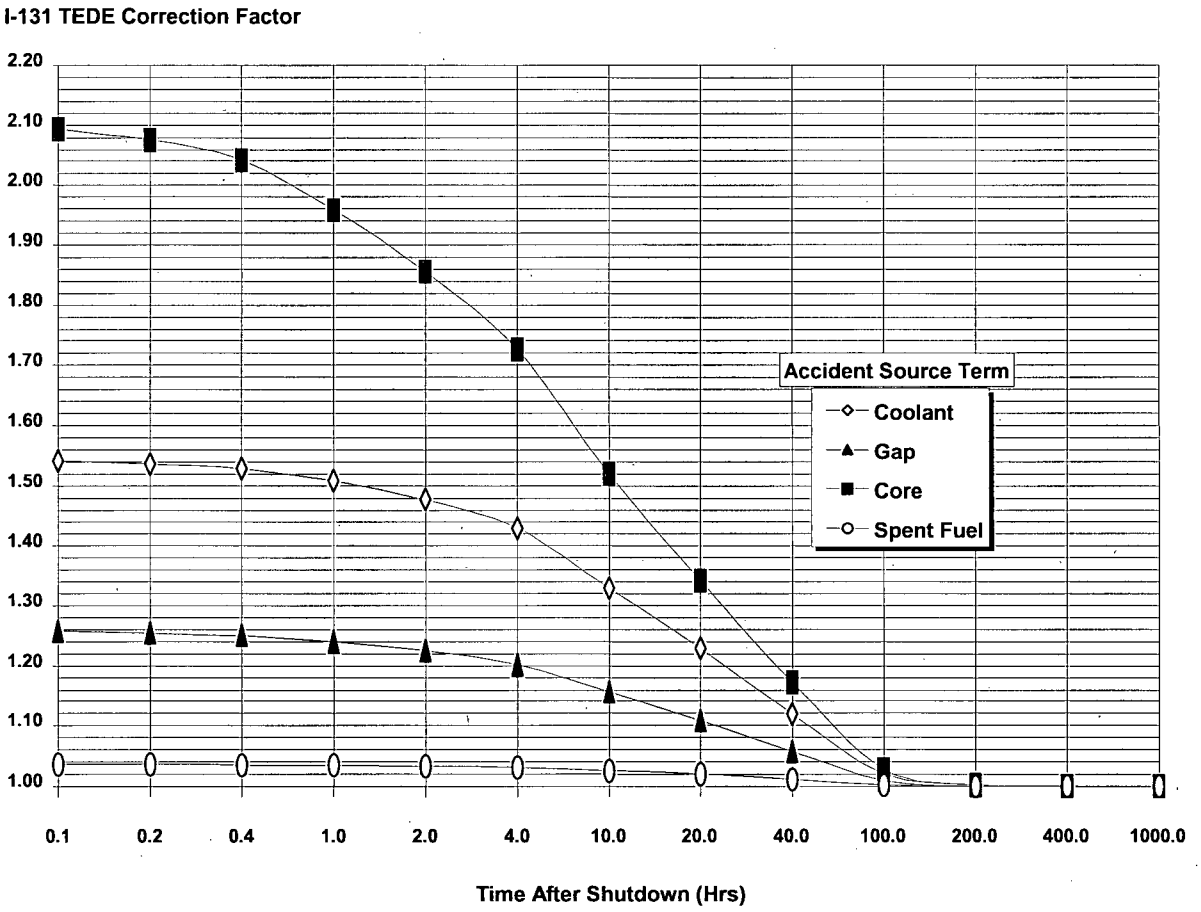
Plant Vent Gross Gamma Monitor Response RE-29, High Range



APPENDIX 6.5

Figure 4.1

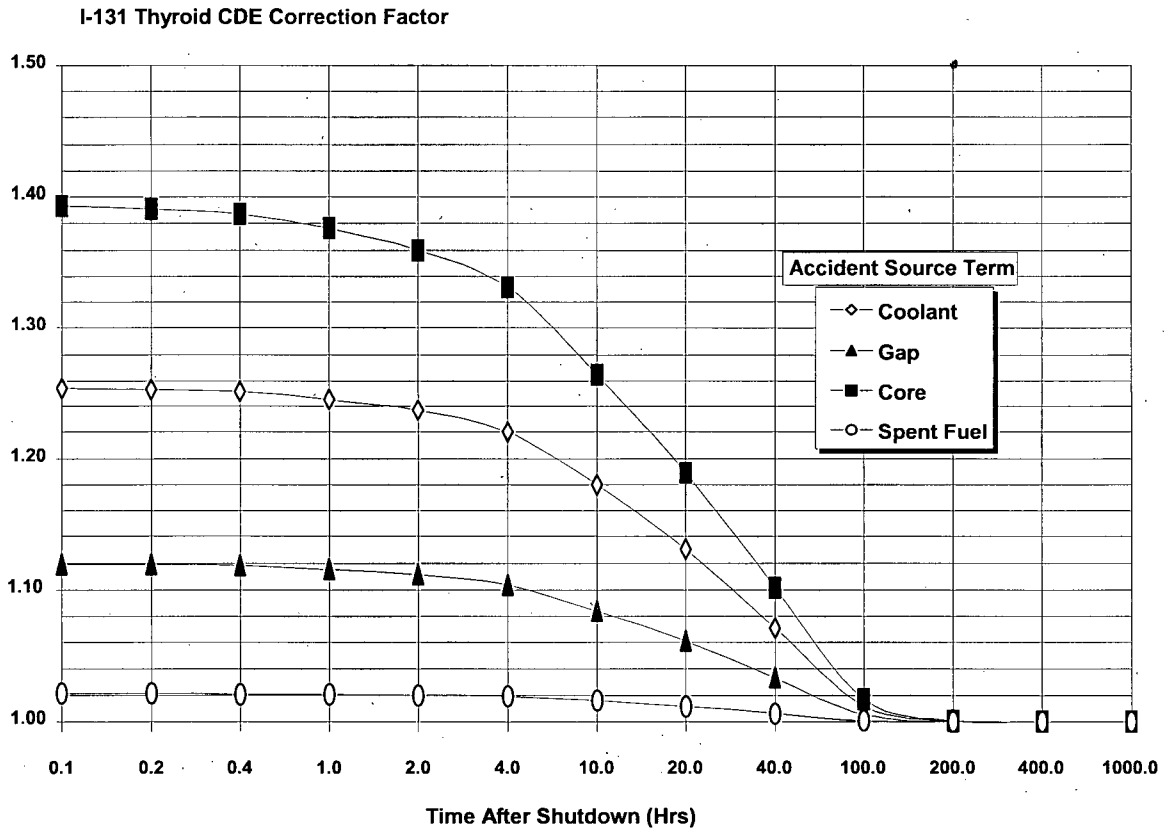
I-131 TEDE Correction Factor



APPENDIX 6.5 (continued)

Figure 4.2

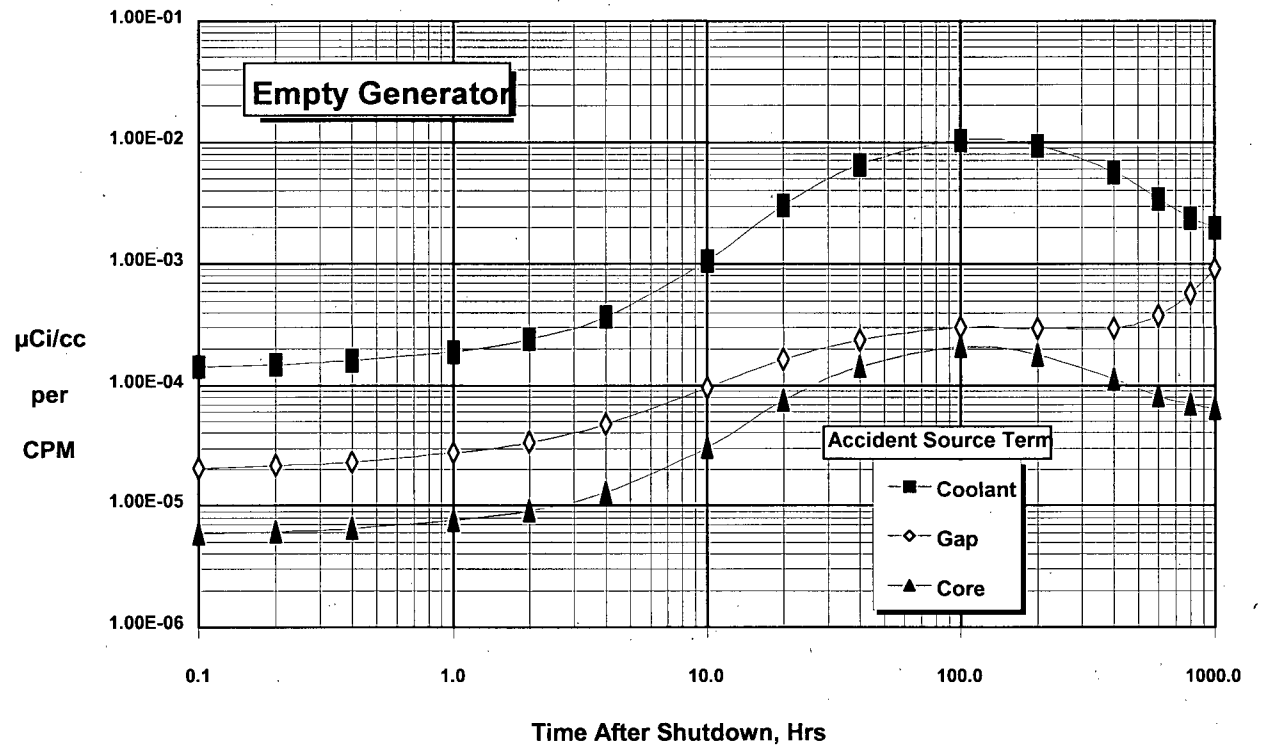
I-131 Thyroid CDE Correction Factor



APPENDIX 6.6

Figure 5.1

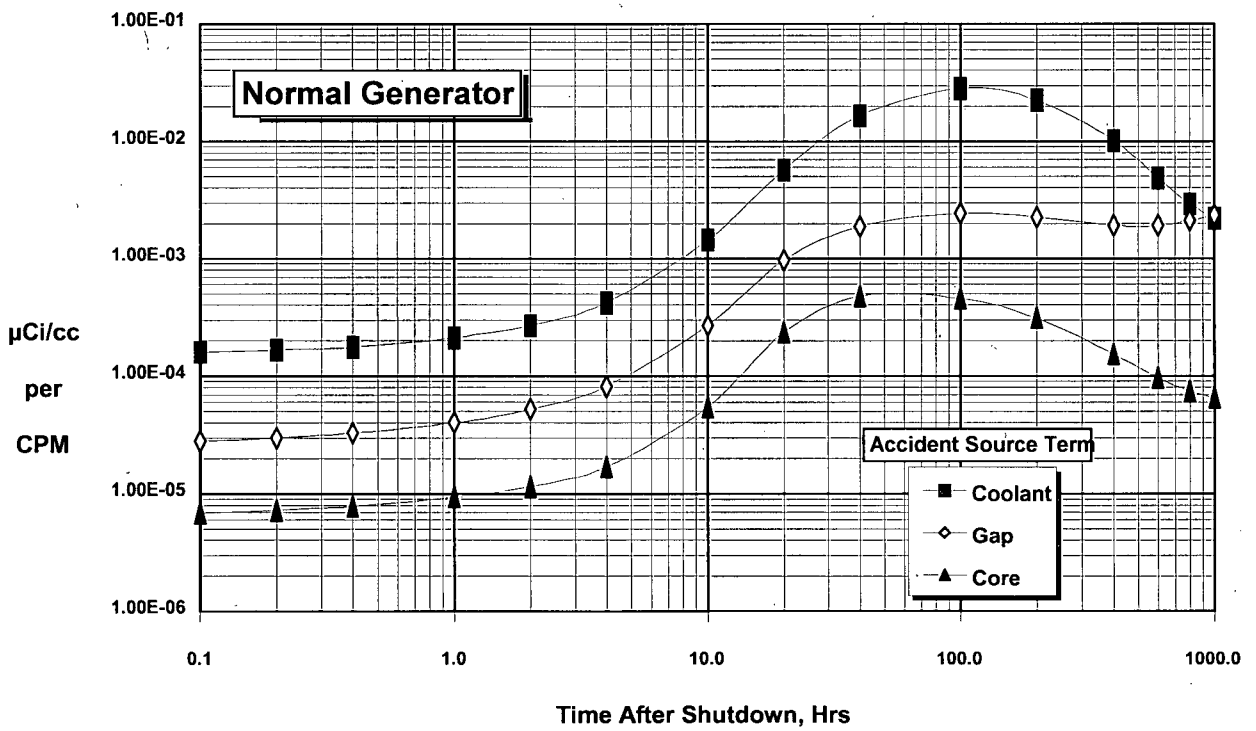
Main Steamline Monitor Response - Empty Generator
RE-71, RE-72, RE-73, RE-74



APPENDIX 6.6

Figure 5.2

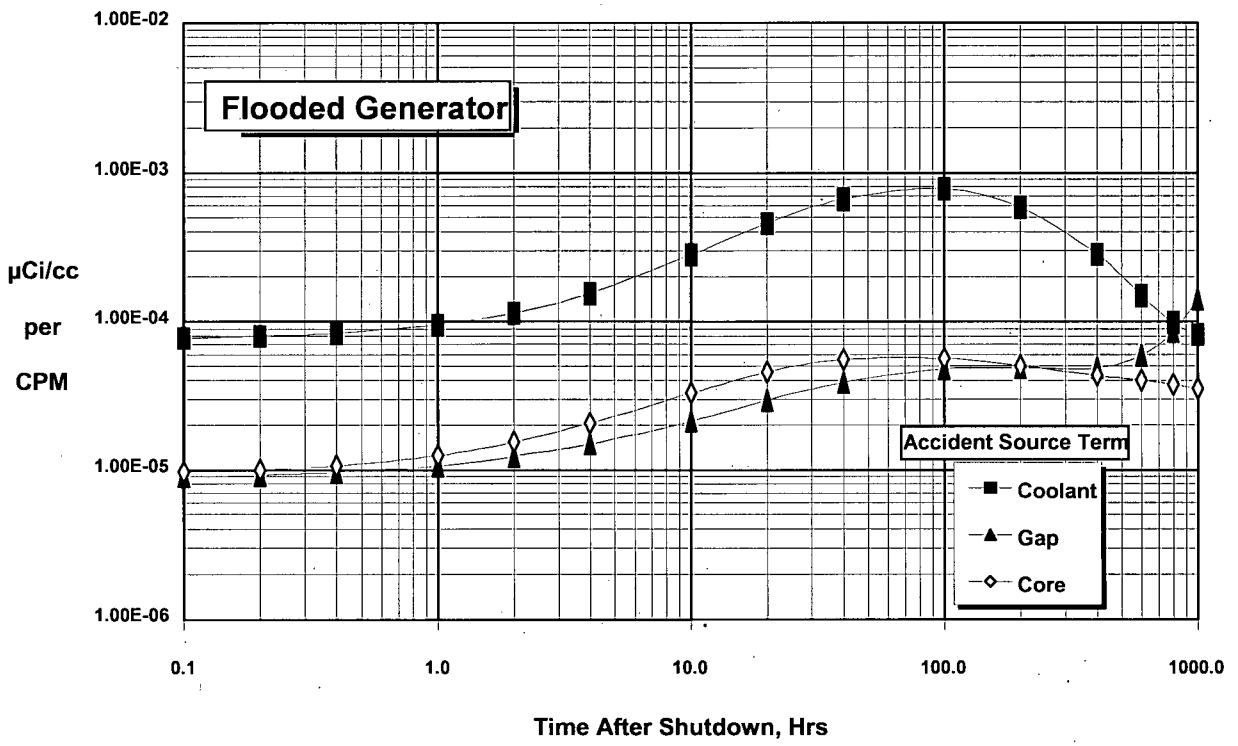
Main Steamline Monitor Response - Normal Generator
RE-71, RE-72, RE-73, RE-74



APPENDIX 6.6 (continued)

Figure 5.3

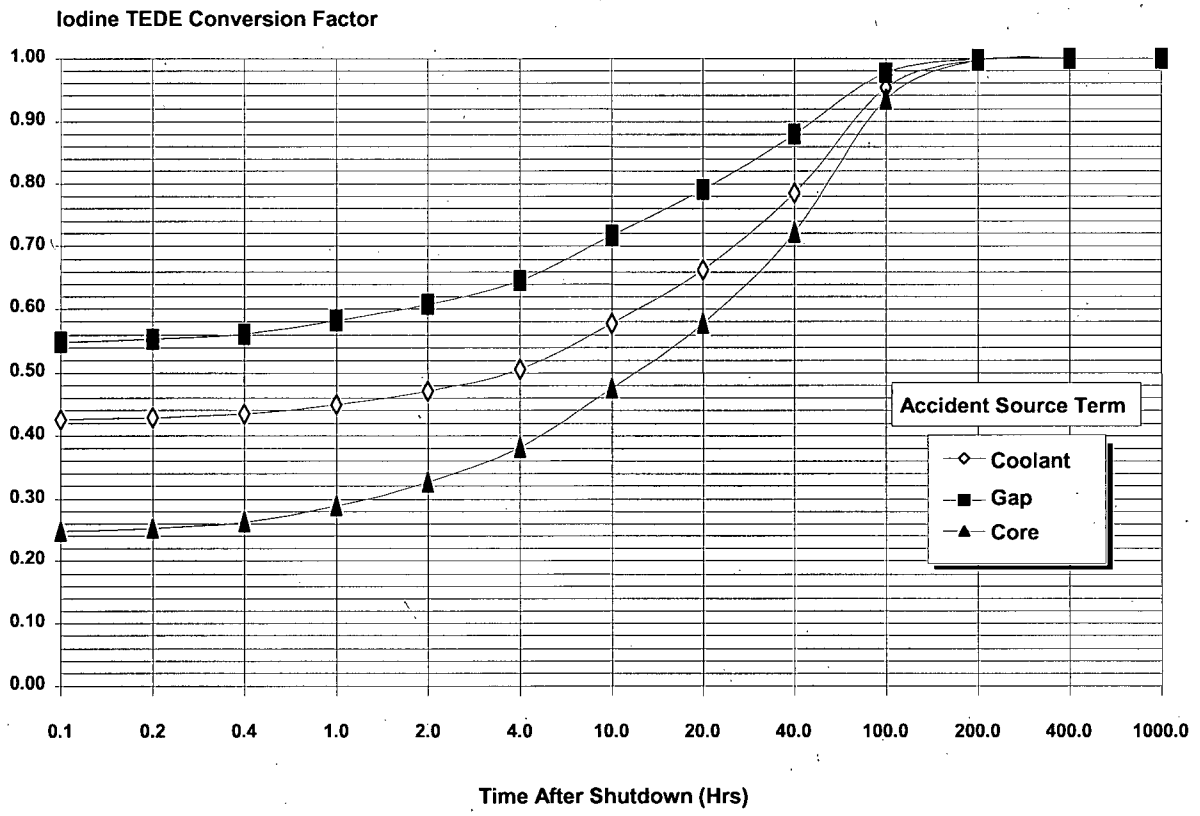
Main Steamline Monitor Response - Flooded Generator
RE-71, RE-72, RE-73, RE-74



APPENDIX 6.7

Figure 6.1

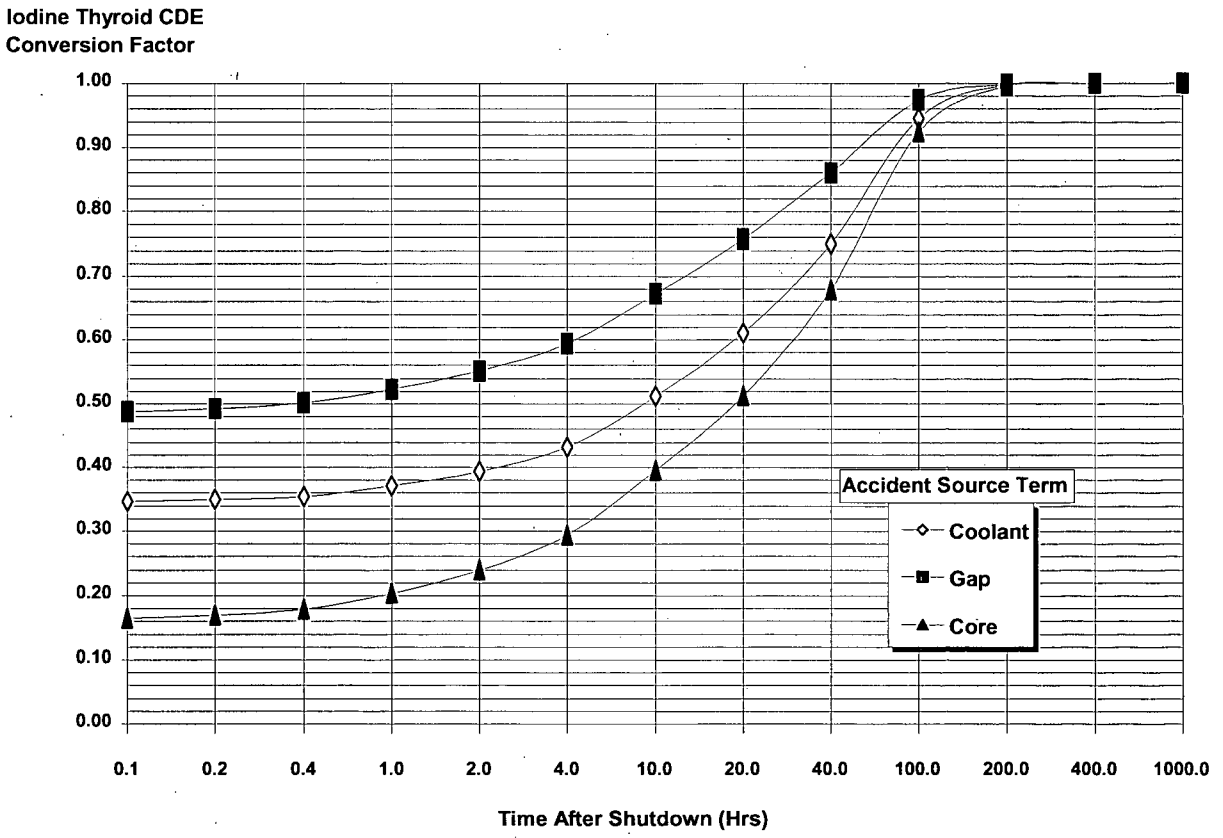
Iodine TEDE Conversion Factor



APPENDIX 6.7 (continued)

Figure 6.2

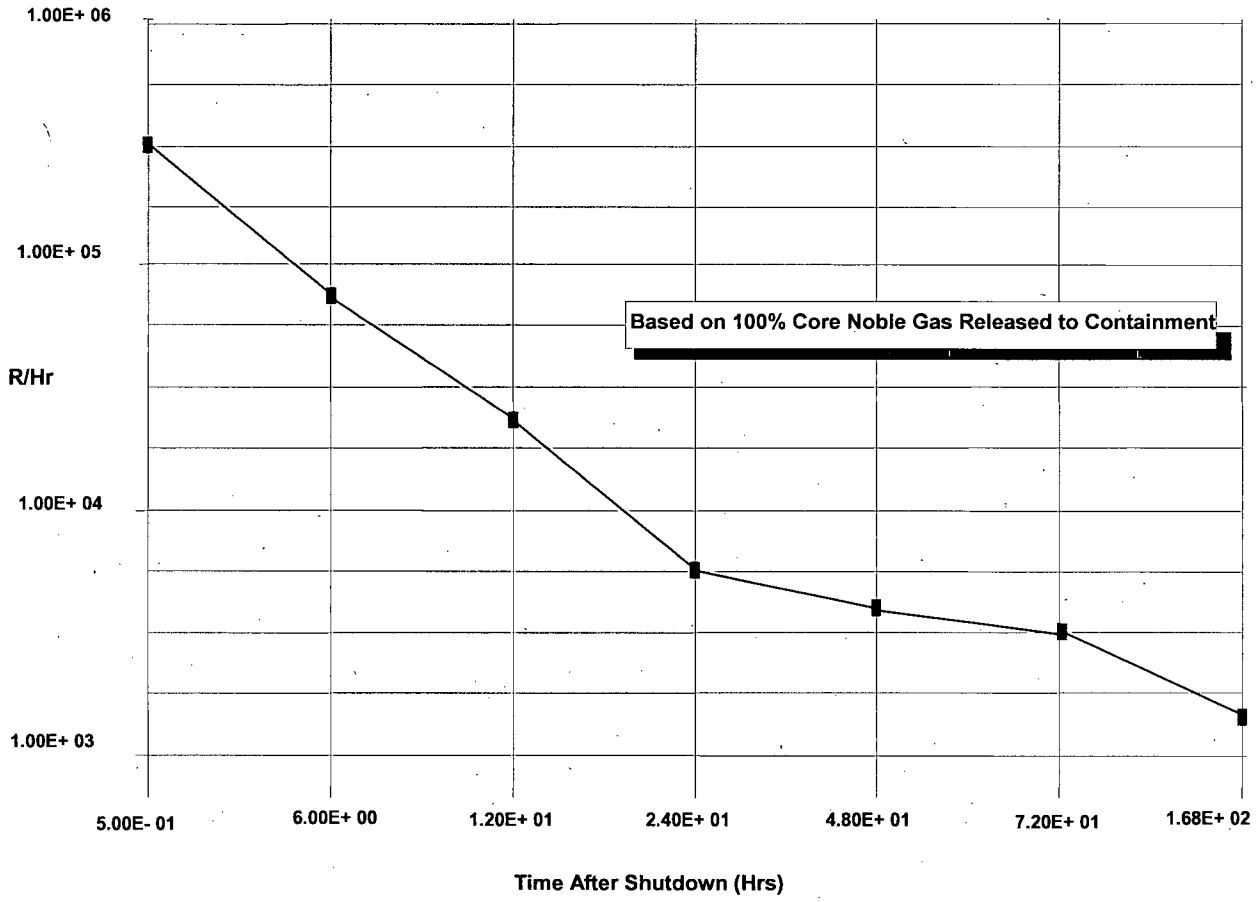
Iodine Thyroid CDE Conversion Factor



APPENDIX 6.8

Figure 7

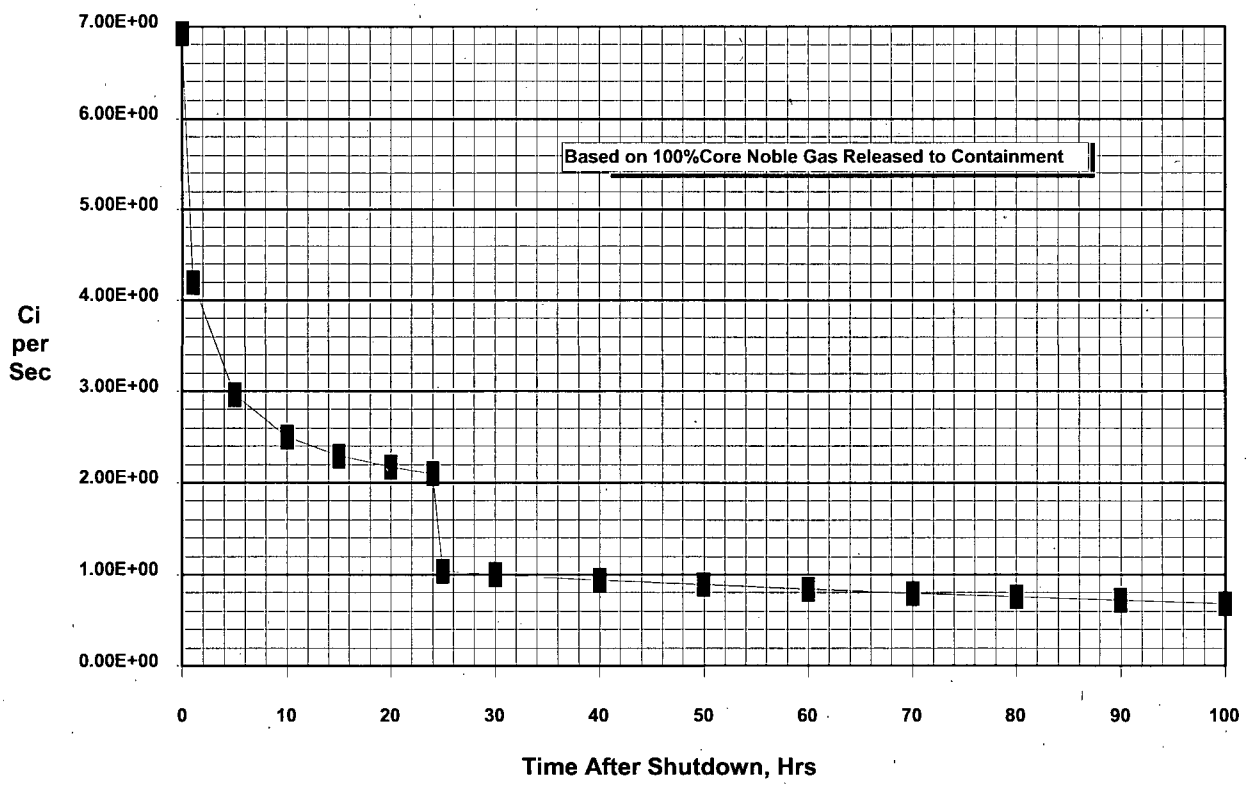
Design Basis Containment Monitor Exposure Rate RE-30 and RE-31



APPENDIX 6.9

Figure 8

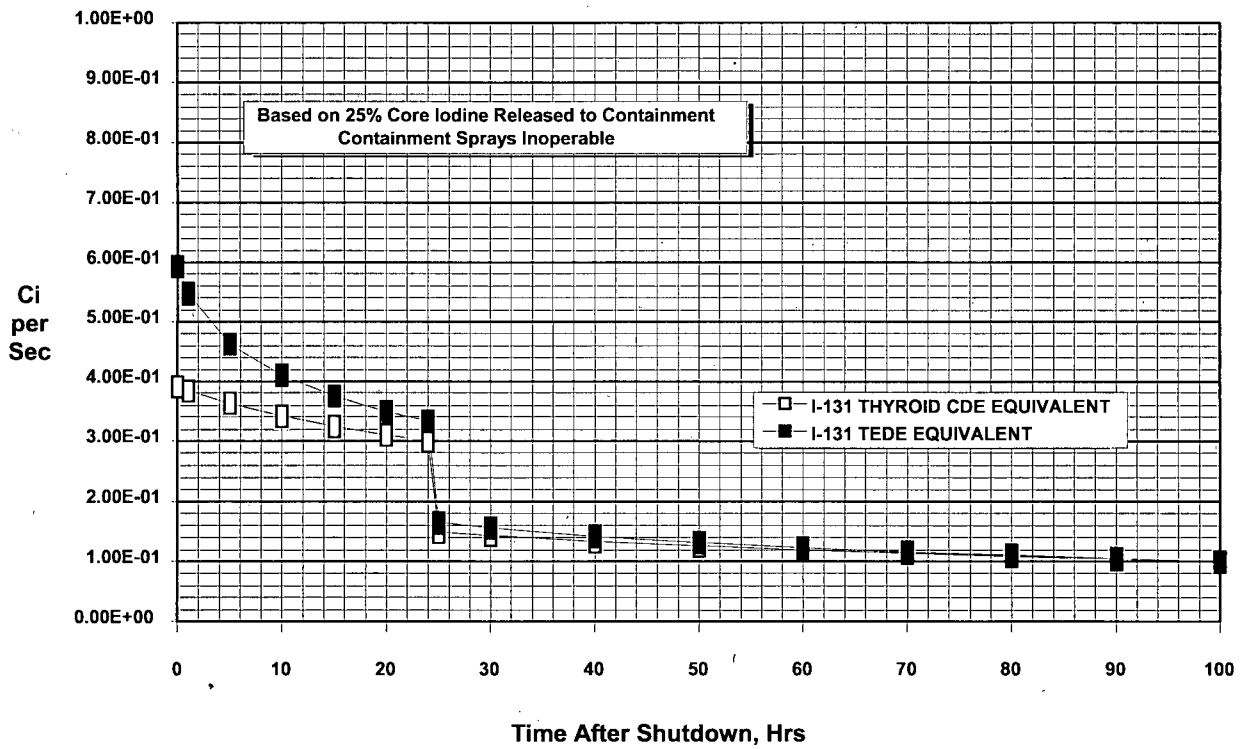
Design Basis Noble Gas Release Rates



APPENDIX 6.10

Figure 9

Design Basis I-131 Equivalent Release Rates



APPENDIX 6.11

Accident Summary Sheets

This Appendix contains summary sheets for the various postulated accidents which have been analyzed in the FSAR. These sheets contain both the "design basis" and "expected" case variables which were assumed in the FSAR analyses. The sheets can be used to compare actual measurements with assumed numbers from the FSAR, in order to help evaluate how things are going in relation to predictions, or they can be used as a source of data to supply unavailable numbers in calculations which are performed at the time of the accident.

Two sets of data are included. The "design basis" case is expected to be highly conservative, where every variable is at a worst-case condition. The "expected" case is the best estimated prediction of what might actually occur. When FSAR values are used to make calculations or predictions at the time of the accident, the "design basis" values can be used to provide a quick upper limit result, but as soon as data becomes available which tends to confirm one case or the other, the one which best agrees with the data should be used.

The accident classifications identified in this Appendix are based on the analyzed off-site doses of the activity releases.

NOTE: Do not use these Summary Sheets to classify emergencies. Always refer to EP G-1 to consider all possible EALs.

EP G-1 classifications based on plant conditions other than off-site doses are presented also to illustrate the relatively close and usually conservative declarations that would be made even before dose calculations were performed.

The summary sheets provided are:

A. MAJOR LOCA
B. MAJOR STEAM LINE BREAK
C. MAJOR FEEDWATER LINE BREAK
D. BLACKOUT (OR PLANT COOLDOWN WITH ATMOSPHERIC DUMP)
E. SMALL LOCA
F. TUBE RUPTURE
G. LOCKED ROTOR
H. FUEL HANDLING ACCIDENT IN FUEL HANDLING BUILDING
I. FUEL HANDLING ACCIDENT IN CONTAINMENT
J. ROD EJECTION ACCIDENT
K. GAS DECAY TANK RUPTURE
L. LIQUID HOLDUP TANK RUPTURE
M. VCT RUPTURE

APPENDIX 6.11 (continued)

Summary Sheet A
Major LOCA

	PARAMETER	FSAR DBA	FSAR EXPECTED
1.	Total Release to Containment Free Volume, Ci		
	a. Xe-133	2.03×10^8	1.36×10^6
	b. Other Noble Gases	5.73×10^8	4.27×10^5
	c. I-131	2.21×10^7	1.82×10^5
	d. Other Iodine	1.90×10^8	2.73×10^5
	e. Source Term	Core	Gap
	f. Release Assumption	100% of core N.G., 25% of core iodines	100% of gap N.G., 25% of gap iodines
2.	Containment Spray Effectiveness		
	a. Removal half-life (hrs)	0.022	0.0075
	b. Number of operable spray pumps	1	2
3.	Containment Leak Rate (%/day)	0.1 for 1st day, 0.05 after 1st day	0.05 for 1st day, 0.025 after 1st day
4.	Total Release to Environs, First 2 Hours, Ci		
	a. Xe-133	16,840	56
	b. Other Noble Gases	25,930	21
	c. I-131	191	0.05
	d. Other Iodine	1,325	0.08
	e. Release Mechanism	Containment Leakage	Containment Leakage

APPENDIX 6.11 (continued)

Summary Sheet A
Major LOCA

	PARAMETER	FSAR DBA	FSAR EXPECTED
5.	(x/Q) CL (sec/m^3)		
	a. 800m (site boundary)	$5.29x10^{-4}$	$5.29x10^{-5}$
	b. 10000m (6 mi. LPZ)	$2.20x10^{-5}$	$2.20x10^{-6}$
6.	Whole Body Dose Results		
	a. Total 800m dose for 1st two hours (Rem)	5.6E+00	3.7E-04
	b. Total 10000m dose for 30 days (Rem)	5.7E-01	6.4E-05
7.	Thyroid Dose Results		
	a. Total 800m dose for 1st two hours (Rem)	9.6E+01	1.3E-03
	b. Total 10000m dose for 30 days (Rem)	1.8E+01	9.2E-04
8.	Accident Classification		
	(Based on above Dose):	General Emergency	Unusual Event
	(Based on EP G-1):	Site Area Emergency	Site Area Emergency
9.	Miscellaneous		
	a. Containment-free volume cc	$7.36x10^{10}$	
	b. RCS Coolant Mass (gm)	$2.4x10^{8}$	

10. References

a. FSAR, September 1990, Revision 6, Section 15.5.

b. DCM No. T-15, Radiation Protection, Rev. 0, February 1993, Table 4.6.

APPENDIX 6.11 (continued)

Summary Sheet B
Major Steam Line Break

	PARAMETER	FSAR DBA	FSAR EXPECTED
1.	Initial Conditions and Assumptions		
	a. Primary Coolant Activity (μCi/gm)		
	1) Xe-133	270	67.2
	2) I-131	2.6	0.65
	3) Other Iodine	7.9	2.0
	b. Secondary Water Activity (μCi/gm)		
	1) I-131	1.5E-02	4.4E-05
	2) Other Iodines	3.7E-02	9.0E-05
	c. Assumed Fuel Defects (%)	1	0.2
	d. Primary to Secondary Leakage (gpm)	1	0.014
	e. Steam Release, 1st Two Hours (lbs)		
	1) Failed Generator	162,784	
	2) Other generator (atmospheric dump)	393,464	
	f. Total Steam Release During 8-Hour Cooldown (lbs)	1,250,000	
	g. Liquid Release Fraction for Iodine		
	1) Failed Generator	0.1	
	2) Other generators	0.01	
2.	Activity Release to Environs, First 2 Hours (Ci)		
	a. Xe-133	1.2E-03	3.5E-07
	b. Other Noble Gases	1.9E-04	5.2E-08
	c. I-131	1.6E-05	4.4E-09
	d. Other Iodines	1.3E-04	3.6E-08
	e. Source Term	RCS	RCS

APPENDIX 6.11 (continued)

Summary Sheet B
Major Steam Line Break

	PARAMETER	FSAR DBA	FSAR EXPECTED
3.	(x/Q) CL (sec/m^3)		
	a. 800m (site boundary)	$5.29x10^{-4}$	$5.29x10^{-5}$
	b. 10000m (6 mi. LPZ)	$2.20x10^{-5}$	$2.20x10^{-6}$
4.	Whole Body Dose Results		
	a. Total 800m dose for 1st two hours (Rem)	1.7E-03	5.4E-07
	b. Total 10000m dose for 30 days (Rem)	2.6E-04	7.8E-08
5.	Thyroid Dose Results		
	a. Total 800m dose for 1st two hours (Rem)	8.8E-02	1.6E-05
	b. Total 10000m dose for 30 days (Rem)	5.3E-02	9.9E-06
6.	Accident Classification		
	(Based on above Dose):	Alert	No Emergency
	(Based on EP G-1):	Unusual Event	Unusual Event
7.	Miscellaneous		
	a. Fluid Mass/Stm Gen (lbs)		
	Water	81,500	
	b. Safety Valve and Steam Dump Valve Capacities (lb/hr/valve)		
	1) S/G safety valve	800,000	
	2) 10% atmospheric dump	380,000	
	3) 35% atmospheric dump	597,000	
8.	References		
	a. FSAR, September 1990, Revision 6, Section 15.5		
	b. DCM No. T-15, Radiation Protection, Rev. 0, February 1993, Table 4.6-19.		

Appendix 6.11 (continued)

Summary Sheet C
Major Feedwater Line Break

The release from this accident comes from release of steam by safety valves and/or atmospheric steam dump of steam generator water during cooldown if the condenser is not available. The steam generator water is contaminated if there is tube leakage. The feedwater itself which is released has very little activity in it and is ignored.

This accident is basically the same as a major steamline break and Summary Sheet B can be used.

Note, however, that the steam release will be through relief valves and so the iodine liquid release fraction should be 0.01 for the entire release. This will reduce the thyroid dose somewhat from the steamline break case.

APPENDIX 6.11 (continued)

Summary Sheet D
Blackout (Plant Cooldown With Atmospheric Dump)

The release from this accident comes from release of steam by safety valves and/or atmospheric steam dump of steam generator water which is contaminated if there is tube leakage.

This accident is basically the same as a steamline break and Summary Sheet B can be used.

Note, however, that the steam release will be through relief valves and so the iodine liquid release fraction should be 0.01 for the entire release. This will reduce the thyroid dose somewhat from the steamline break case.

APPENDIX 6.11 (continued)

Summary Sheet E
Small LOCA (Release of Coolant to Containment)

	PARAMETER	FSAR DBA	FSAR EXPECTED
1.	Initial Coolant Activity (μCi/gm)		
	a. Xe-133	270	45.7
	b. Other Noble Gases	30	5.6
	c. I-131	2.62	0.45
	d. Other Iodine	7.88	1.35
	e. Source Term	RCS	RCS
	f. Fuel Defects (%)	1	0.2
2.	Initial Release to Containment (Ci)		
	a. Xe-133	65,430	16,280
	b. Other Noble Gases	7,950	1,980
	c. I-131	63	16
	d. Other Iodine	193	48
	e. Assumption	100% of Coolant N.G. activity +10% of coolant iodines	100% of Coolant N.G. Activity +10% of coolant iodines
3.	Containment Spray Effectiveness		
	a. Removal Coefficient (hr^{-1})	31	92
	b. Number of operable spray pumps	1	2
4.	Containment Leak Rate (%/day)	0.1 for 1st day, 0.05 after 1st day	0.05 for 1st day, 0.025 after 1st day
5.	(x/Q) CL (sec/m^3)		
	a. 800m (site boundary)	5.29×10^{-4}	5.29×10^{-5}
	b. 10000m (6 mi. LPZ)	2.20×10^{-5}	2.20×10^{-6}

APPENDIX 6.11 (continued)

Summary Sheet E
Small LOCA (Release of Coolant to Containment)

	PARAMETER	FSAR DBA	FSAR EXPECTED
6.	Whole Body Dose Results		
	a. Total 800m dose for 1st two hours (Rem)	1.8E-04	4.4E-06
	b. Total 10000m dose for 30 days (Rem)	5.0E-05	1.4E-06
7.	Thyroid Dose Results		
	a. Total 800m dose for 1st two hours (Rem)	2.0E-04	9.0E-07
	b. Total 10000m dose for 30 days (Rem)	3.0E-05	1.0E-07
8.	Accident Classification		
	(Based on above Dose):	Unusual Event	No Emergency
	(Based on EP G-1):	Site Area Emergency	Site Area Emergency
9.	Miscellaneous		
	a. Containment-Free Volume (cc)	7.36×10^{10}	
	b. RCS Coolant Mass (gm)	2.4×10^{8}	
	c. Liquid Release Fraction for Iodine	0.1	
10.	References		
	a. FSAR, Table 15.5-11.		
	b. DCM No. T-15, Radiation Protection, Rev. 0, February 1993, Table 4.6-17.		

APPENDIX 6.11 (continued)

Summary Sheet F
Tube Rupture

PARAMETER	FSAR DBA	FSAR EXPECTED
1. Initial Conditions and Assumptions (Pre-accident Iodine Spike Case)		
a. Primary Coolant Activity (μCi/gm)		
1) Xe-133	270	67.2
2) I-131 (equivalent)	60	
3) I-131	41.4	0.65
4) Other Iodine	110.4	2.0
b. Secondary Water Activity (μCi/gm)		
1) I-131	6.9E-02	4.4E-05
2) Other Iodines	1.8E-01	9.0E-05
c. Assumed Fuel Defects (%)	1	0.2
d. Primary to Secondary Leakage (gpm)		
1) Pre-existing	1	0.014
2) Tube Rupture	160	
e. Steam Release, 1st Two Hours (lbs)		
1) Failed generator	146,700	31,000
2) Other generators (atmospheric dump)	445,000	380,000
f. Total Steam Release During 8 hour Cooldown (lbs)	1,530,000	1,500,000
g. Liquid Release Fraction for Iodine		
1) Failed generator	0.01 *(1)	0.01
2) Other generators	0.01 *(1)	0.01

(1) 0.01 when rupture site is covered 1.0 when covered by less than 12" water

APPENDIX 6.11 (continued)

Summary Sheet F
Tube Rupture

	PARAMETER	FSAR DBA	FSAR EXPECTED
2.	Total Release to Environs First 2 hours (Ci) (Pre-Accident Iodine Spike)		
	a. Xe-133	2.8E+04	2.4E+03
	b. Other Noble Gases	2.0E+03	2.4E+02
	c. I-131	5.5E+02	1.4E-01
	d. Other Iodines	1.4E+03	6.2E-01
	e. Source Term	RCS	RCS
3.	(x/Q) CL (sec/m^3)		
	a. 800 m (site boundary)	$5.29x10^{-4}$	$5.29x10^{-5}$
	b. 10000m (6 mi. LPZ)	$2.20x10^{-5}$	$2.20x10^{-6}$
4.	Whole Body Dose Results		
	a. Total 800m dose for 1st two hours (Rem)	2.3E-01	7.7E-03
	b. Total 10000m dose for 30 days (Rem)	1.0E-02	3.0E-04
5.	Thyroid Dose Results		
	a. Total 800m dose for 1st two hours (Rem)	1.9E+02	4.3E-03
	b. Total 10000m dose for 30 days (Rem)	8.0E+00	2.0E-04
6.	Accident Classification		
	(Based on above Dose):	General Emergency	Alert
	(Based on EP G-1):	Site Area Emergency	Site Area Emergency

APPENDIX 6.11 (continued)

Summary Sheet F
Tube Rupture

PARAMETER	FSAR DBA	FSAR EXPECTED
7. Miscellaneous		
a. Fluid Mass/Steam Gen (lbs)		
1) Water	81,500	
b. Safety Valve and Steam Dump Valve Capacities (lbs/hr/valve)		
1) S/G safety valve	800,000	
2) 10% atmospheric dump	380,000	
3) 35% atmospheric dump	597,000	

8. References

a. FSAR, Revision 7, September 1991, Tables 15.5-64 thru 15.5-74.

b. DCM No. T-15, Radiation Protection, Rev. 0, February 1993, Table 4.6-16.

APPENDIX 6.11 (continued)

Summary Sheet G
Locked Rotor Accident

	PARAMETER	FSAR DBA	FSAR EXPECTED
1.	Total Release to Environs, 1st Two Hours (Ci)		
	a. Xe-133	2.7E+02	6.3E-06
	b. Other Noble Gases	5.5E+01	9.6E-06
	c. I-131	8.6E-01	8.2E-08
	d. Other Iodines	1.3E+00	2.8E-07
	e. Source Term	Gap	Gap
	f. Assumptions		
	1) Coolant Activity	1% fuel defects +3% of gap activity	0.2% fuel defects +3% of gap activity
	2) Primary to Secondary Leakage (gpm)	1	0.014
	3) Secondary Steam Release, 1st Two Hours (lbs)	520,000	520,000
	4) Total Steam Release During 8 Hour Cooldown (lbs)	1,600,000	1,600,000
2.	(x/Q) CL (sec/m^3)		
	a. 800m (site boundary)	$5.29x10^{-4}$	$5.29x10^{-5}$
	b. 1000m (6 mi. LPZ)	$2.20x10^{-5}$	$2.20x10^{-6}$
3.	Whole Body Dose Results		
	a. Total 800m dose for 1st two hours (Rem)	1.3E-02	1.6E-05
	b. Total 10000m dose for 30 days (Rem)	1.1E-03	1.2E-06
4.	Thyroid Dose Results		
	a. Total 800m dose for 1st two hours (Rem)	3.0E-01	2.5E-04
	b. Total 10000m dose for 30 days (Rem)	7.2E-02	6.2E-05

APPENDIX 6.11 (continued)

Summary Sheet G
Locked Rotor Accident

	PARAMETER	FSAR DBA	FSAR EXPECTED
5.	Accident Classification		
	(Based on above Dose):	Alert	No Emergency
	(Based on EP G-1)	Alert	Alert
6.	Miscellaneous		
	a. Fluid Mass/Steam Gen (lbs)		
	1) Water	81,500	
	b. Safety Valve and Steam Dump Valve Capacity (lbs/hr/valve)		
	1) S/G safety valve	800,000	
	2) 10% atmospheric dump	380,000	
	3) 35% atmospheric dump	597,000	
	c. Liquid Release Fraction for Iodines	0.01	
7.	References		
	a. FSAR, Tables 15.5-41 and 42.		
	b. DCM No. T-15, Radiation Protection, Rev. 0, February 1993, Table 4.6-14.		

APPENDIX 6.11 (continued)

Summary Sheet H
Fuel Handling Accident in Fuel Handling Bldg

	PARAMETER	FSAR DBA	FSAR EXPECTED
1.	Initial Conditions		
	a. Radial Peaking Factor of Damaged Assembly	1.65	1.26
	b. Elapsed Time Since Reactor Shutdown (hrs)	100	100
	c. Type of Release to Pool	100% of assembly gap activity	100% of assembly gap activity
	d. Bundle Submergence (ft)	26	26
	e. Pool Decontamination Factor for Iodine	100	760
	f. Total Assembly Gap Activity at Time of Accident		
	1) Xe-133	100,000	8,137
	2) Other Noble Gases	4,500	1,500
	3) I-131	52,670	5,282
	4) Other Iodines	7,000	220
	5) Source	Spent Fuel	Spent Fuel
2.	(x/Q) CL (sec/m^3)		
	a. 800m (site boundary)	5.29×10^{-4}	5.29×10^{-5}
	b. 1000m (6 mi. LPZ)	2.20×10^{-5}	2.20×10^{-6}
3.	Total Release to Environs, 1st Two Hours (Ci)		
	a. Xe-133	100,400	523
	b. Other Noble Gases	4,100	101
	c. I-131	80	0.005
	d. Other Iodines	10	0.0002
	e. Source Term	Spent Fuel	Spent Fuel

APPENDIX 6.11 (continued)

Summary Sheet H
Fuel Handling Accident in Fuel Handling Bldg

	PARAMETER	FSAR DBA	FSAR EXPECTED
4.	Whole Body Dose Results		
	a. Total 800m dose for 1st two hours (Rem)	2.5E+00	1.5E-03
	b. Total 10000m dose for 30 days (Rem)	1.0E-01	6.1E-05
5.	Thyroid Dose Results		
	a. Total 800m dose for 1st two hours (Rem)	2.2E+01	8.2E-05
	b. Total 10000m dose for 30 days (Rem)	9.2E-01	3.4E-06
6.	Accident Classification		
	(Based on above dose):	General Emergency	Alert
	(Based on EP G-1):	Site Area Emergency	Site Area Emergency
7.	Miscellaneous		
	a. Fuel Handling Building Volume (ft^3)	435,000	
	b. Fuel Handling Building Exhaust Rate (cfm)	35,700	35,700
	c. Filter Cleanup Factor	0.10	0.01
8.	References		
	a. FSAR, Tables 15.5-43 through 15.5-47.		
	b. DCM No. T-15, Radiation Protection, Rev. 0, February 1993, Table 4.6-22.		

APPENDIX 6.11 (continued)

Summary Sheet I
Fuel Handling Accident in Containment

	PARAMETER	FSAR DBA	FSAR EXPECTED
1.	Initial Conditions		
	a. Radial Peaking Factor of Damaged Assembly	1.65	1.26
	b. Elapsed Time Since Reactor Shutdown (hrs)	100	100
	c. Type of Release to Pool	100% of assembly gap activity	100% of assembly gap activity
	d. Bundle Submergence (ft)	26	26
	e. Pool Decontamination Factor for Iodine	100	760
	f. Total Assembly Gap Activity at Time of Accident (Ci)		
	1) Xe-133	100,000	8,137
	2) Other Noble Gases	4,500	1,500
	3) I-131	52,670	5,282
	4) Other Iodines	7,000	220
	5) Source Term	Spent Fuel	Spent Fuel
2.	(x/Q) CL (sec/m^3)		
	a. 800m (site boundary)	5.29×10^{-4}	5.29×10^{-5}
	b. 1000m (6 mi. LPZ)	2.20×10^{-5}	2.20×10^{-6}
3.	Total Release to Environs, 1st Two Hours (Ci)		
	a. Xe-133	12,460	38
	b. Other Noble Gases	557	7
	c. I-131	65	0.033
	d. Other Iodines	8.7	0.0013
	e. Source Term	Spent Fuel	Spent Fuel

APPENDIX 6.11 (continued)

Summary Sheet I
Fuel Handling Accident in Containment

	PARAMETER	FSAR DBA	FSAR EXPECTED
4.	Whole Body Dose Results		
	a. Total 800m dose for 1st two hours (Rem)	3.1E-01	1.0E-04
	b. Total 10000m dose for 30 days (Rem)	1.3E-02	4.0E-06
5.	Thyroid Dose Results		
	a. Total 800 m dose for 1st two hours (Rem)	1.8E+01	6.0E-04
	b. Total 10000m dose for 30 days (Rem)	7.6E-01	3.0E-05
6.	Accident Classification		
	(Based on above Dose):	General Emergency	Alert
	(Based on EP G-1):	Site Area Emergency	Alert
7.	Miscellaneous Activity Release Mechanism	Activity released from cavity to containment atmosphere is confined directly above the cavity water level. It is picked up by the fan coolers and sent out through the containment purge.	

8. References

a. FSAR, Tables 15.5-48 through 15.5-50.

b. DCM No. T-15, Radiation Protection, Rev. 0, February 1993, Section 4.6.7.21.

APPENDIX 6.11 (continued)

Summary Sheet J
Rod Ejection Accident

	PARAMETER	FSAR DBA	FSAR EXPECTED
1.	Total Release to Containment Free Volume (Ci)		
	a. Xe-133	2.01×10^5	1.52×10^5
	b. Other Noble Gases	6.82×10^4	6.22×10^4
	c. I-131	7.32×10^3	7.28×10^3
	d. Other Iodine	1.11×10^4	1.09×10^4
	e. Source Term	Gap	Gap
	f. Release Assumption	Coolant activity (1% defects) plus 10% of core gap activity times a liquid release fraction of either 0.1 (for I) or 1.0 (for N.G.)	Coolant activity (0.2% defects) plus 10% of core gap activity times a liquid release fraction of either 0.1 (for I) or 1.0 (for N.G.)
2.	Containment Spray Effectiveness		
	a. Removal half-life (hrs)	0.022	0.0075
	b. Number of operable spray pumps	1	2
3.	Containment Leak Rate (%/day)	0.1	0.05
4.	(x/Q) CL (sec/m^3)		
	a. 800m (site boundary)	5.29×10^{-4}	5.29×10^{-5}
	b. 1000m (6 mi. LPZ)	2.20×10^{-5}	2.20×10^{-6}
5.	Total Release to Environs, 1st 2 Hours (Ci)		
	a. Xe-133	11.2	5.6
	b. Other Noble Gases	4.1	2.0
	c. I-131	0.0098	0.002
	d. Other Iodine	0.015	0.002
	e. Source Term	Gap	Gap
	f. Release Mechanism	Containment Leakage	Containment Leakage

APPENDIX 6.11 (continued)

Summary Sheet J
Rod Ejection Accident

	PARAMETER	FSAR DBA	FSAR EXPECTED
6.	Whole Body Dose Results		
	a. Total 800m dose for 1st two hours (Rem)	7.3E-04	3.6E-05
	b. Total 1000m dose for 30 days (Rem)	1.3E-04	6.4E-06
7.	Thyroid Dose Results		
	a. Total 800m dose for 1st two hours (Rem)	3.3E-03	3.7E-05
	b. Total 10000m dose for 30 days (Rem)	1.4E-04	1.6E-06
8.	Accident Classification		
	(Based on above Dose):	Unusual Event	No Emergency
	(Based on EP G-1):	Site Area Emergency	Site Area Emergency
9.	Miscellaneous		
	a. Containment free volume (cc)	7.36×10^{10}	
	b. RCS Coolant Mass (gm)	2.4×10^{8}	
10.	References		
	a. FSAR, Table 15.5-52.		
	b. DCM T-15, Radiation Protection, Rev. 0, February 1993, Table 4.6-13.		

APPENDIX 6.11 (continued)

Summary Sheet K
Gas Decay Tank Rupture

	PARAMETER	FSAR DBA	FSAR EXPECTED
1.	Total Release to Environs, 1st Two Hours (Ci)		
	a. Xe-133	65,400	16,300
	b. Other Noble Gases	7,300	2,140
2.	(x/Q) CL (sec/m^3)		
	a. 800m (site boundary)	$5.29x10^{-4}$	$5.29x10^{-5}$
	b. 10000m (6 mi. LPZ)	$2.20x10^{-5}$	$2.20x10^{-6}$
3.	Whole Body Dose Results		
	a. Total 800m dose for 1st two hours (Rem)	2.0E+00	4.4E-02
	b. Total 10000m dose for 30 days (Rem)	8.4E-02	1.8E-03
	NOTE: Thyroid doses are negligible.		
4.	Accident Classification		
	(Based on above Dose):	General Emergency	Site Area Emergency
	(Based on EP G-1):	Alert	Alert
5.	Miscellaneous		
	a. Tank Volume (cc)	$2.18x10^{7}$	
	b. Tank Press (psi)	100	
	c. Volume Released (cc)	$1.48x10^{8}$	
6.	References		
	a. FSAR, Table 15.5-53.		
	b. DCM T-15, Radiation Protection, Rev. 0, February 1993, Table 4.6-23.		

APPENDIX 6.11 (continued)

Summary Sheet L
Liquid Holdup Tank Rupture

	PARAMETER	FSAR DBA	FSAR EXPECTED
1.	Activity in Holdup Tank (Ci)		
	a. Xe-133	51,000	10,200
	b. Other Noble Gases	4,710	930
	c. I-131	492	98.3
	d. Other Iodines	1,086	217
	e. Source Term	RCS	RCS
2.	Cleanup Parameters		
	a. Liquid Release Fraction for Iodines from Tank to Auxiliary Building Atmosphere	10^{-4}	10^{-4}
	b. Charcoal Filter Cleanup Factor	0.1	0.01
	c. Release Duration (hrs)	2	2
3.	Activity Release to Environs, 1st Two Hours (Ci)		
	a. Xe-133	51,000	10,200
	b. Other Noble Gases	4,710	930
	c. I-131	0.00492	9.8E-5
	d. Other Iodines	0.01086	2.17E-4
4.	(x/Q) CL (sec/m^3)		
	a. 800m (site boundary)	$5.29x10^{-4}$	$5.29x10^{-5}$
	b. 10000m (6 mi. LPZ)	$2.20x10^{-5}$	$2.20x10^{-6}$
5.	Whole Body Dose Results		
	a. Total 800m dose for 1st two hours (Rem)	1.4E+00	3.7E-02
	b. Total 10000m dose for 30 days (Rem)	6.0E-02	1.6E-03

APPENDIX 6.11 (continued)

Summary Sheet L
Liquid Holdup Tank Rupture

	PARAMETER	FSAR DBA	FSAR EXPECTED
6.	Thyroid Dose Results		
	a. Total 800m dose for 1st two hours (Rem)	1.9E-03	2.6E-06
	b. Total 10000m dose for 30 days (Rem)	8.0E-05	1.1E-07
7.	Accident Classification		
	(Based on Dose):	Site Area Emergency	Site Area Emergency
	(Based on EP G-1):	Alert	Alert
8.	Miscellaneous		
	a. Tank Volume (cc)	3.03×10^8	
9.	References		

a. FSAR, Table 15.5-56.

b. DCM T-15, Radiation Protection, Rev. 0, February 1993, Table 4.6-24.

APPENDIX 6.11 (continued)

Summary Sheet M
Volume Control Tank Rupture

	PARAMETER	FSAR DBA	FSAR EXPECTED
1.	Activity in VCT (Ci)		
	a. Xe-133	3,330	828
	b. Other Noble Gases	198	42
	c. I-131	12.1	3.0
	d. Other Iodines	35	8.7
	e. Source Term	RCS	RCS
2.	Cleanup Parameters		
	a. Liquid Release Fraction for Iodines from Tank to Auxiliary Building Atmosphere	10^{-4}	10^{-4}
	b. Charcoal Filter Cleanup Factor	0.1	0.01
	c. Release Duration (hrs)	2	2
3.	Activity Release to Environs, 1st Two Hours (Ci)		
	a. Xe-133	3,330	828
	b. Other Noble Gases	198	42
	c. I-131	0.00012	3E-6
	d. Other Iodines	0.00035	9E-6
4.	(x/Q) CL (sec/m^3)		
	a. 800m (site boundary)	$5.29x10^{-4}$	$5.29x10^{-5}$
	b. 1000m (6 mi. LPZ)	$5.20x10^{-5}$	$2.20x10^{-6}$
5.	Whole Body Dose Results		
	a. Total 800m dose for 1st two hours (Rem)	4.7E-01	9.3E-03
	b. Total 10000m dose for 30 days (Rem)	1.9E-02	3.9E-04

APPENDIX 6.11 (continued)

Summary Sheet M
Volume Control Tank Rupture

	PARAMETER	FSAR DBA	FSAR EXPECTED
6.	Thyroid Dose Results		
	a. Total 800m dose for 1st two hours (Rem)	3.3E-05	4.4E-08
	b. Total 10000m dose for 30 days (Rem)	1.4E-06	1.8E-09
7.	Accident Classification		
	(Based on Dose):	Site Area Emergency	Alert
	(Based on EP G-1):	Alert	Alert
8.	Miscellaneous		
	a. Tank Volume (cc)	1.1×10^7	
9.	References		

a. FSAR, Table 15.5-57.

b. DCM T-15, Radiation Protection, Rev. 0, February 1993, Table 4.6-25.

DIABLO CANYON POWER PLANT
EP RB-9
ATTACHMENT 7.1 **1 AND 2**

TITLE: Noble Gas and I-131 Equivalent Release Rates for a Plant Vent Release

SECTION 1 - GENERAL INFORMATION

1.1 Enter the following information: Unit # _____

Date _____ Time of Readings _____ Calculation # _____

Date _____ Time of Rx S/D _____ Calculation By: _____
(Rx S/D) (name)

1.2 Determine the TIME AFTER RX S/D _____ (Hrs)

Use Table 1 (Appendix 6.1) to determine Probable Source Term (circle one):

CORE GAP RCS SPENT FUEL

SECTION 2 - PLANT VENT FLOW RATE

Flow Rate Indicator FR-12 Operable

2.1 If FR-12 is operable, record below the flow rate reading indicated. Go to Section 2.3.

Plant Vent Flow Rate = _____ cfm
2.1

Flow Rate Indicator FR-12 Inoperable

2.2 a. If FR-12 is not operable, determine the Plant Vent Flow Rate by summing the operating fan flow rates below.

Number of Operating Fans			Fan Exhaust Rate		Pathway Flow Rate
FHB	_____	x	35,750 cfm	=	_____ cfm
Aux Bldg	_____	x	73,500 cfm	=	_____ cfm
Containment Purge	_____	x	55,000 cfm	=	_____ cfm
GE/GW	_____	x	25,000 cfm	=	_____ cfm
Containment H_2	_____	x	300 cfm	=	_____ cfm
			Plant Vent Flow Rate = Σ Fan Flow Rates	=	_____ cfm (2.2)

Plant Vent Flow Rate

2.3 Convert "Plant Vent Flow Rate" units:

Plant Vent Flow Rate		Conversion Factor		Plant Vent Flow Rate
_____ cfm (2.1 or 2.2)	x	472 cc/sec/cfm	=	_____ cc/sec (2.3)

EP RB-9 (UNITS 1 AND 2)
ATTACHMENT 7.1

TITLE: Noble Gas and I-131 Equivalent Release Rates for a Plant Vent Release

SECTION 3 - NOBLE GAS RELEASE

Noble Gas Concentration

3.1 a. Record the plant vent radiation "Monitor Reading" from the EARS, ARMS, or RMS panel* in the Control Room (see Note below). Use RE-29 only if the RE-14/14R/87 monitors are unavailable.

b. Calculate the "Noble Gas Concentration" using the Monitor Response Factor from Figure 1, 2, or 3.

* **NOTE:** Monitor Readings from the Control Room RMS Panel read in µCi/cc. If this reading is used in lieu of raw data, enter the value directly in 3.2 below.

Monitor Reading		Monitor Response Factor		Noble Gas Concentration
_____cpm (RE-14/14R)	x	_____µCi/cc/cpm (Figure 1)	=	_____µCi/cc
_____Amps (RE-87)	x	_____µCi/cc/Amps (Figure 2)	=	_____µCi/cc
_____mR/hr (RE-29)	x	_____µCi/cc/mR/hr (Figure 3)	=	_____µCi/cc

Noble Gas Release Rate

3.2 a. Enter below the "Noble Gas Concentration" from Section 3.1 and the "Plant Vent Flow Rate" from Section 2.3.

b. Calculate and record below "Noble Gas Release Rate."

Noble Gas Concentration		Conversion Factor		Plant Vent Flow Rate	Noble Gas Release Rate
_____µCi/cc (3.1)	x	1E-6 Ci/µCi	x	_____cc/sec (2.3)	= _____Ci/sec (3.2)

EP RB-9 (UNITS 1 AND 2)
ATTACHMENT 7.1

TITLE: Noble Gas and I-131 Equivalent Release Rates for a Plant Vent Release

SECTION 4 - IODINE RELEASE

Iodine Monitors

****

CAUTION: Do not attempt to access RE-24R or RE-87 without authorization from Radiation Protection.

****

4.1 Use the RE-24 or RE-24R iodine monitor (if on scale), or the extended range iodine sampler (RF-87), and go to the corresponding section to calculate the Iodine-131 equivalent release rate.

RE-24,	RE-24R (Normal range monitoring)	Concentration Mode	→Section 5
	RE-24R (High range monitoring)	Count Rate Mode	→Section 6
RF-24R,	RF-87 (High range sampling)		→Section 7

SECTION 5 - RE-24, RE-24R (Normal range monitoring) Concentration Mode

I-131 Release Rate

5.1 a. Calculate the "I-131 Release Rate" using the higher of RE-24 and RE-24R.

I-131 Concentration		Plant Vent Flow Rate		Plateout Correction		Conversion Factor		I-131 Release Rate
_____ µCi/cc	x	_____ cc/sec	x	1.3	x	1E-6 Ci/µCi	=	_____ Ci/sec
RE-24 or RE-24R		2.3						5.1

I-131 Equivalent Release Rate

5.2 a. Calculate the "I-131 TEDE Equivalent Release Rate" and "I-131 Thyroid CDE Equivalent Release Rate" using Figure 4.1 and Figure 4.2 correction factors.

I-131 Release Rate		I-131 TEDE Correction Factor		I-131 TEDE Equivalent Release Rate
_____ Ci/sec	x	_____	=	_____ Ci/sec
5.1		Figure 4.1		5.2.A

I-131 Release Rate		I-131 Thyroid CDE Correction Factor		I-131 Thyroid CDE Equivalent Release Rate
_____ Ci/sec	x	_____	=	_____ Ci/sec
5.1		Figure 4.2		5.2.B

SECTION 6 - RE-24R (High range monitoring) Count Rate Mode

Flow Rate Ratio

6.1 a. Calculate "Flow Rate Ratio." Normal flow rate ratio is 1.3E5.

Plant Vent Flow Rate		RE-24R Flow Rate		Flow Rate Ratio		Default Ratio
_____cc/sec	÷	_____cc/sec	=	_____	or	1.3E5
2.3		Local indication		6.1		

I-131 Collection Rate

6.2 a. Record the "CPM Change Rate" as reported by personnel operating the RMS panel. (This data is gathered using EP RB-12 Section 6.1.3)

b. Calculate and record below the "I-131 Collection Rate."

CPM Change Rate		Conversion Factor		I-131 Collection Rate
_____cpm/min	x	1.4E-7 µCi min/cpm sec	=	_____µCi/sec
				6.2

I-131 Release Rate

6.3

I-131 Concentration		Flow Rate Ratio		Plateout Correction		Conversion Factor		I-131 Release Rate
_____µCi/sec	x	_____	x	1.3	x	1E-6 Ci/µCi	=	_____Ci/sec
6.2		6.1						6.3

I-131 Equivalent Release Rate

6.4 a. Calculate the "I-131 TEDE Equivalent Release Rate" and "I-131 Thyroid CDE Equivalent Release Rate" using Figure 4.1 and Figure 4.2 correction factors.

I-131 Release Rate		I-131 TEDE Correction Factor		I-131 TEDE Equivalent Release Rate
_____Ci/sec	÷	_____	=	_____Ci/sec
6.3		Figure 4.1		6.4.A

I-131 Release Rate		I-131 Thyroid CDE Correction Factor		I-131 Thyroid CDE Equivalent Release Rate
_____Ci/sec	x	_____	=	_____Ci/sec
6.4		Figure 4.2		6.4.B

TITLE: Noble Gas and I-131 Equivalent Release Rates for a Plant Vent Release

SECTION 7 - RF-24R, RF-87 (High range sampling)

I-131 Release Rate

7.1 a. Record below the I-131 Concentration for the RF-24R or RF-87 silver zeolite cartridge determined by EP RB-12, Section 6.2 (RF-24R) or 6.3 (RF-87).

b. Calculate and record "I-131 Release Rate."

I-131 Concentration		Plant Vent Flow Rate		Plateout Correction	Conversion Factor	I-131 Release Rate
_____ µCi/cc	x	_____ cc/sec	x	1.9	x 1E-6 Ci/µCi	= _____ Ci/sec
EP RB-12		2.3				7.1

I-131 Equivalent Release Rate

7.2 a. Calculate the "I-131 TEDE Equivalent Release Rate" and "I-131 Thyroid CDE Equivalent Release Rate" using Figure 4.1 and Figure 4.2 correction factors.

I-131 Release Rate		I-131 TEDE Correction Factor	I-131 TEDE Equivalent Release Rate
_____ Ci/sec	÷	_____	= _____ Ci/sec
7.1		Figure 4.1	7.2.A

I-131 Release Rate		I-131 Thyroid CDE Correction Factor	I-131 Thyroid CDE Equivalent Release Rate
_____ Ci/sec	x	_____	= _____ Ci/sec
7.2		Figure 4.2	7.2.B

DIABLO CANYON POWER PLANT
EP RB-9
ATTACHMENT 7.2 **1 AND 2**

TITLE: Noble Gas and I-131 Equivalent Release Rates for a Steam Release

SECTION 1 - GENERAL INFORMATION

1.1 Enter the following information: Unit # _____

Date _____ Time of Readings _____ Calculation # _____

Date _____ Time of Rx S/D _____ Calculation By: _____
(Rx S/D) (name)

1.2 Determine the TIME AFTER RX S/D _____ (Hrs)

Use Table 1 (Appendix 6.1) to determine appropriate Source Term. (circle one):

CORE GAP RCS SPENT FUEL

1.3 Indicate the faulty steam generator by placing a check mark in a box below. Go to Section 2.1 or 2.2.

Faulted Steam Generator	MSL Radiation Monitor	MSL Flow Rate Indicator	Narrow Range Recorder	10% Steam Dumps	Safety Relief Valves
[ ] SG-1	RE-71	FI-512	LR-517	PCV-19	RV-3,4,5,6,222
[ ] SG-2	RE-72	FI-522	LR-527	PCV-20	RV-7,8,9,10,223
[ ] SG-3	RE-73	FI-532	LR-537	PCV-21	RV-11,12,13,14,224
[ ] SG-4	RE-74	FI-542	LR-547	PCV-22	RV-15,16,17,18,225

SECTION 2 - STEAM FLOW RATE

MSL Flow Rate Indicator Operable

2.1 If the MSL Flow Rate Indicator on the faulty steam generator in Section 1.3 is operable, record below the greater of the reading indicated, or 4E5 lb/hr. Go to Section 2.3.

$$FR\text{-}512,522,532,542 = \frac{\text{MSL Flow Rate}^{*}}{2.1} \text{ lb/hr}$$

* If less than 4E5 lb/hr, record and use 4E5 lb/hr.

MSL Flow Rate Indicator Inoperable

2.2 a. If the MSL flow rate indicator on the faulty steam generator in Section 1.3 is not operable, determine and record the "Number of Valves Open" releasing steam. ONLY INCLUDE VALVES OPEN ON THE MSL WITH THE FAULTY STEAM GENERATOR IN SECTION 1.3.

SECTION 2 - STEAM FLOW RATE (Continued)

2.2 b. Calculate the "MSL Flow Rate" by summing the "Valve Flow Rates." Go to Section 2.3.

Number of Valves Open			Flow Rate		Valve Flow Rate
10% Steam Dumps	_____	x	4.0 E5 lb/hr	=	_____ lb/hr
Safety Reliefs	_____	x	8.5 E5 lb/hr	=	_____ lb/hr
			MSL Flow Rate = Σ Valve Flow Rates	=	_____ lb/hr (2.2)

Steam Flow Rate

2.3 Calculate and record the "Steam Flow Rate" using the "MSL Flow Rate," from Section 2.1 or 2.2. Go to Section 3.1 or 3.2.

MSL Flow Rate		Conversion Factor	Steam Flow Rate
_____ (2.1 or 2.2)	lb/hr x	3.1 cc hr/lb sec =	_____ (2.3) cc/sec

SECTION 3 - ISOTOPIC STEAM ACTIVITY FRACTIONS

Isotopic Steam Activity Fractions - RCS Sample Analysis

NOTE: If RCS Sample is not available, then skip Section 3.1 at this time and proceed with Section 3.2 (Page 4).

3.1 a. Record the date and time the Reactor Coolant System (RCS) sample was collected.

RCS Sample Collection Date and Time: __/__/__, __:__

b. Record in Section 3.1.h below the "RCS Sample Activity Concentrations" for noble gases, iodines, and particulates.

c. Determine the faulty steam generator water level using the Narrow Range Level indication:

Steam Generator Water Level 3.1.c

	[ ] Empty	[ ] Normal	[ ] Flooded
S/G Level Narrrow Range:	<13%	13% - 96%	>96%

SECTION 3 - ISOTOPIC STEAM ACTIVITY FRACTIONS (Continued)

3.1 d. Determine the "Steam Partition Factors" for iodines and particulates using the water level indicated in Section 3.1.c. Record the "Steam Partition Factors" in Section 3.1.h below.

Steam Partition Factors

	Empty	Normal	Flooded
Iodines	0.10	0.01	1.00
Particulates	0.01	0.01	1.00

e. Determine the "Density Correction" using the water level indicated in Section 3.1.c. Record the "Density Correction" below.

Density Correction

	Empty	Normal	Flooded
All	0.056	0.056	1

f. Calculate and record below the "Steam Activity Concentrations" for noble gases, iodines, and particulates by multiplying each "RCS Sample Activity Concentration," times each "Steam Partition Factor" times "Density Correction."

g. Calculate and record below the "Total Steam Activity Concentration" by summing the "Steam Activity Concentrations" for noble gases, iodines, and particulates.

h. Calculate and record below the "Steam Activity Fractions" for noble gases, iodines, and particulates by dividing each "Steam Activity Concentration" by the "Total Steam Activity Concentration." Go to Section 4 or 5.

	RCS Sample Activity Concentration	Steam Partition Factor	Density Correction	(For Section 5.1) Steam Activity Concentration	(For Section 4.2) Steam Activity Fraction
Noble Gases	_____ µCi/cc	x 1.00		= _____ µCi/cc (a)	_____ a ÷ d
Iodines	_____ µCi/cc	x _____	x _____	= _____ µCi/cc (b)	_____ b ÷ d
Particulates	_____ µCi/cc	x _____		= _____ µCi/cc (c)	_____ c ÷ d

Total Steam Activity Concentration = _____ µCi/cc
d = a+b+c

SECTION 3 - ISOTOPIC STEAM ACTIVITY FRACTIONS (Continued)

Isotopic Steam Activity Fractions - FSAR Design Basis - Use only if RCS Sample is not available

3.2 a. Determine the faulty steam generator water level using the Narrow Range Level indication:

	Steam Generator Water Level		
	[ ] Empty	[ ] Normal	[ ] Flooded
S/G Level Narrrow Range:	<13%	13% - 96%	>96%

b. Determine the FSAR "Steam Activity Fractions" for noble gases, iodines, and particulates using the water level indicated in Section 3.2.a. Record the "Steam Activity Fractions" in Section 4.2.c.

FSAR - Steam Activity Fractions

	Empty	Normal	Flooded
Noble Gases	9.96E-01	9.99E-01	9.51E-01
Iodines	3.36E-03	3.37E-04	3.20E-02
Particulates	1.78E-04	1.79E-04	1.70E-02

SECTION 4 - RELEASE RATES - MSL RADIATION MONITORS OPERABLE

NOTE: If there appears to be no net RE-7x indication, but the Control Room verifies that the monitor showed an initial Nitrogen-16 response or currently responds to check-source actuation, the monitor is OPERABLE. In this case the entire "background" reading may be used for this calculation to establish an "upper-bound" release estimate, but the method of Section 5.2 should be used to determine release rate if possible.

MSL Activity Concentrations

4.1 a. Record the "MSL Monitor Reading" for the faulty steam generator indicated in Section 1.3.

b. Calculate and record the "MSL Activity Concentration" using the appropriate "MSL Monitor response from Figure 5.1, 5.2, or 5.3.

MSL Monitor Reading		MSL Monitor Response		Conversion Factor		MSL Activity Concentration
_____	cpm x	_____	µCi/cc/cpm	x 1E-6 Ci/µCi =		_____ Ci/cc
RE-71,72,73,74		Appendix 6.6				4.1

TITLE: Noble Gas and I-131 Equivalent Release Rates for a Steam Release

SECTION 4 - RELEASE RATES - MSL RADIATION MONITORS OPERABLE (Continued)

Isotopic Release Rates

4.2 a. If a RCS sample is available, enter the "Steam Activity Fraction" from Section 3.1. If a RCS sample is not available, enter below the FSAR "Steam Activity Fraction" from Section 3.2.

b. Enter the "MSL Activity Concentration" from Section 4.1 and the "Steam Flow Rate" from Section 2.3.

c. Calculate and record "Isotopic Release Rate" for noble gases, iodines, and particulates. Go to Section 6.1.

	Steam Activity Fraction		MSL Activity Concentration		Steam Flow Rate	Isotopic Release Rate
Noble Gases	_____ (3.1 or 3.2)					_____ Ci/sec (4.2)
Iodines	_____ (3.1 or 3.2)	x	_____ Ci/cc (4.1)	x	_____ cc/sec (2.3) =	_____ Ci/sec (4.2)
Particulates	_____ (3.1 or 3.2)					_____ Ci/sec (4.2)

SECTION 5-RELEASE RATES-MSL RADIATION MONITORS INOPERABLE-RCS ANALYSIS

RCS Sample Analysis - Known Steam Flow Rates

5.1 a. Calculate and record "Isotopic Release Rate" for noble gases, iodines, and particulates using the "Steam Activity Concentrations" from Section 3.1. Go to Section 6.1.

	Steam Activity Concentration		Steam Flow Rate		Conversion Factor	Isotopic Release Rate
Noble Gases	_____ µCi/cc (3.1)					_____ Ci/sec (5.1)
Iodines	_____ µCi/cc (3.1)	x	_____ cc/sec (2.3)	x	1E-6 Ci/µCi =	_____ Ci/sec (5.1)
Particulates	_____ µCi/cc (3.1)					_____ Ci/sec (5.1)

EP RB-9 (UNITS 1 AND 2)
ATTACHMENT 7.2

TITLE: Noble Gas and I-131 Equivalent Release Rates for a Steam Release

SECTION 5 - RELEASE RATES - MSL RADIATION MONITORS INOPERABLE - RCS ANALYSIS (Continued)

RCS Sample Analysis - Known Primary to Secondary Leak Rate

5.2 a. Enter the "RCS Sample Activity Concentrations" and "Steam Partition Factors" for noble gases, iodines, and particulates recorded in Section 3.1.h (Page 3).

b. Enter the "Primary to Secondary Leak Rate."

c. Calculate and record "Isotopic Release Rate" for noble gases, iodines, and particulates. Go to Section 6.1.

	RCS Sample Activity Concentration		Steam Partition Factors		Primary to Secondary Leak Rate		Conversion Factor		Isotopic Release Rate
Noble Gases	_____ μCi/cc (3.1)	x	_____					=	_____ Ci/sec (5.2)
Iodines	_____ μCi/cc (3.1)	x	_____	x	_____ gpm	x	6.3E-05 (Ci cc min) / (μCi gal sec)	=	_____ Ci/sec (5.2)
Particulates	_____ μCi/cc (3.1)	x	_____					=	_____ Ci/sec (5.2)

SECTION 6 - NOBLE GAS AND I-131 EQUIVALENT RELEASE RATES

6.1 a. Enter below the "Noble Gases Release Rate" and "Iodine Release Rate" from Section 4.2, 5.1, or 5.2.

b. Determine "Iodine TEDE Conversion Factor" using Figure 6.1 and "Iodine Thyroid CDE Conversion Factor" using Figure 6.2 and record below.

c. Calculate and record "I-131 TEDE Equivalent Release Rate" and "I-131 Thyroid CDE Release Rate."

Enter result of 4.2, 5.1 or 5.2

Noble Gas Release Rate = _____ Ci/sec (6.1)

Iodine Release Rate		Iodine TEDE Conversion Factor	I-131 TEDE Equivalent Release Rate
_____ Ci/sec (4.2, 5.1, or 5.2)	x	_____ (Figure 6.1)	= _____ Ci/sec (6.1)

Iodine Release Rate		Iodine Thyroid CDE Conversion Factor	I-131 Thyroid CDE Equivalent Release Rate
_____ Ci/sec (4.2, 5.1, or 5.2)	x	_____ (Figure 6.2)	= _____ Ci/sec (6.1)

DIABLO CANYON POWER PLANT
EP RB-9
ATTACHMENT 7.3 **1 AND 2**

TITLE: Noble Gas and I-131 Equivalent Release Rates for Containment Leakage

SECTION 1 - GENERAL INFORMATION

1.1 Enter the following information: Unit # _____

Date _____ Time of Readings _____ Calculation # _____

Date _____ Time of Rx S/D _____ Calculation By: _____
(Rx S/D) (name)

1.2 Determine the TIME AFTER RX S/D _____ (Hrs)

Use Table 1 (Appendix 6.1) to determine appropriate Source Term. (circle one):

CORE GAP RCS SPENT FUEL

SECTION 2 - FSAR DESIGN BASIS NOBLE GAS AND I-131 EQUIVALENT RELEASE RATES

Average RE-30 and RE-31 Monitor Reading

2.1 Calculate the "Average Monitor Reading" for RE-30 and RE-31.

NOTE: If RE-30 and RE-31 are INOPERABLE, record the "EQUIVALENT RE-30/31 READING" from EP RB-14, 4.3.3.

RE-30 Monitor Reading		RE-31 Monitor Reading		Average Monitor Reading
(_____R/hr	x	_____R/hr)$^{1/2}$ =		_____R/hr
				2.1

Average Monitor Reading to FSAR Design Basis Exposure Rate Ratio

2.2 Calculate the "Monitor to Design Basis Ratio" using Figure 7.

Average Monitor Reading		FSAR Design Basis Exposure Rate		Monitor to Design Basis Ratio
_____R/hr	÷	_____R/hr =		_____
2.1		Figure 7		2.2

TITLE: Noble Gas and I-131 Equivalent Release Rates for Containment Leakage

SECTION 2 - FSAR DESIGN BASIS NOBLE GAS AND I-131 EQUIVALENT RELEASE RATES

Noble Gas Release Rate

2.3 Calculate the "Noble Gas Release Rate" using Figure 8.

Monitor to Design Basis Ratio		Design Basis Noble Gas Release Rate		Noble Gas Release Rate
_____	x	_____ Ci/sec	=	_____ Ci/sec
2.2		Figure 8		2.3

I-131 Equivalent Release Rate

2.4 a. Determine the "Design Basis I-131 TEDE and Thyroid CDE Equivalent Release Rate" using Figure 9 and record below.

b. Calculate and record "I-131 TEDE Equivalent Release Rate" and the I-131 Thyroid CDE Equivalent Release Rate.

Monitor to Design Basis Ratio		Design Basis I-131 TEDE Equivalent Release Rate		I-131 TEDE Equivalent Release Rate
_____	x	_____ Ci/sec	=	_____ Ci/sec
2.2		Figure 9		2.4

Monitor to Design Basis Ratio		Design Basis I-131 Thyroid CDE Equivalent Release Rate		I-131 Thyroid CDE Equivalent Release Rate
_____	x	_____ Ci/sec	=	_____ Ci/sec
2.2		Figure 9		2.4

TITLE: Operating Instructions for the EARS Computer Program

1 AND 2

03/13/09
EFFECTIVE DATE

PROCEDURE CLASSIFICATION: QUALITY RELATED

TABLE OF CONTENTS

1. SCOPE

1.1 This procedure provides instructions for the use of the Emergency Assessment Response System (EARS) interface.

1.2 The EARS program incorporates the proprietary dose assessment program, MIDAS, as part of the dose assessment system.

1.3 This procedure is intended to be used as a reference for the Health Physicist and Emergency Supervising Engineer.

2. DISCUSSION

2.1 EARS is the computer system that obtains and processes plant meteorological and radiological data to determine release rates for use in dose assessment calculations.

2.2 MIDAS is the software program that performs atmospheric dispersion and dose assessment calculations. MIDAS runs inside the EARS system.

2.3 This procedure provides general guidelines for using the EARS system. Personnel using the EARS system for emergency response should be fully trained and qualified.

3. DEFINITIONS

None

4. RESPONSIBILITIES

4.1 The Emergency Supervising Engineer or Health Physicist is responsible for performing this procedure in support of dose assessment for the UDAC. In the event of failure of the EARS computer in the EOF/UDAC, the Radiological Data Processor or Radiological advisor in the TSC may perform dose assessment calculations.

5. INSTRUCTIONS

5.1 Starting EARS

5.1.1 Two EARS workstations are available to the ERO. One EARS computer is located in the Unified Dose Assessment Center (UDAC) section of the EOF. The other is located in the Technical Support Center.

a. The Program is started by double-clicking the "Shortcut to EARS" button. You will be prompted to select either:

NOTE: Running the program in Drill mode without the drill feeder operating may result in a run-time error.

- Drill (program uses emergency preparedness drill files), or
- Emergency (program uses actual monitored data)

b. After you make your selection, click "OK" to continue.

c. After you click OK, the program will take a few seconds to load source term and radiation monitor data and then prompt you for your USER ID. This entry is optional, but recommended. If you choose to enter this information, enter your PG&E LAN ID or the facility where you are running EARS (EOF/TSC).

****

CAUTION: If the next step the EARS program does not load the historic (24 hour) meteorology data, EARS was shut down incorrectly during the previous use (event). Proceed to section 5.2 for instructions on how to shut down EARS and restart a valid EARS event.

****

d. Click "OK". The program will then begin "Initializing the Met data", loading the historic meteorology data (24 hours of data for determining wind field vectors). This may take a minute or two.

e. When complete, the program will load the main input screen, which will require several user inputs based on the release path selected.

f. Verify the current date and time information is in the "Reactor Shutdown", "Release Start" and the "Update" Date/Time fields.

g. If the dates and times are correct, proceed with step 5.3 (skip 5.2).

h. If the dates and times are incorrect, proceed with step 5.2.

5.2 Resolving an invalid startup of EARS

NOTE: The initial time parameters for EARS should contain current date and time information in the "Reactor Shutdown", "Release Start" and the "Update" Date/Time fields. If EARS was not shut down correctly on the previous use, the Date/Time fields will contain dates and times from the last update performed in that event.

5.2.1 If the date and time does not reflect the current date and time in any of the following fields ("Reactor Shutdown", "Release Start", or "Update"), use the following steps to shutdown and restart EARS:

a. Enter a "quarter hour" time of at least 30 minutes previous to now in both the "Reactor Shutdown" and "Release Start" Date/Time fields.

b. Enter a "quarter hour" time in the "Update" Date/Time field - 15 minutes later than the release start time entered in step 5.2.1a.

c. Click the "Calculate" button

d. Click "OK" in the "Validate Inputs" screen. There will be up to a one minute delay while EARS performs that release rate calculation (the program will automatically print an input report with all the assumptions being used for the calculation)

e. Click "OK" (Green button) when the "MIDAS Accident Dose Calculation" screen is displayed

f. Click "Start Calc" (Green button) when the "MIDAS Accident Dose Calculation Diablo Canyon Menu A" screen is displayed. The program will then display the TEDE plot.

g. Click "OK" when the "Print" dialogue box is displayed

h. Click upper right corner X to Close the report (Word document) window and return to the MIDAS graphical display (the program will automatically print a projected dose report with all the assumptions being used for the calculation).

i. Click "End Run" to exit MIDAS

j. Select "Exit without saving" and click OK

k. Select "Quit" from the Menu Bar

l. Select "Yes" to quit EARS when the following dialog box appears: "EARS Quit Posted Do you want to end the event?"

5.2.2 Restart the program by double-clicking the EARS icon and go to 5.1.1a.

5.3 Selecting Plant Unit

5.3.1 You must select either Unit 1 or Unit 2 when you begin data entry for the program.

5.4 Entering Time/Date information in EARS

5.4.1 The initial time parameters for EARS should contain current time and date information. If EARS was not exited correctly on the previous use, the time and date fields will contain information from the last update performed. If the date and time information is incorrect:

- Select "Quit" from the Menu Bar
- Select "Yes" to Quit
- Restart the program by double-clicking the EARS icon

5.4.2 Three pieces of time information are needed prior to initiating an EARS run:

- Reactor Shutdown Time – needed to decay the source term (Gap or Core inventory) to the correct radionuclide fractions. EARS will be automatically round the time to the nearest quarter hour preceding the time entered. This time may be the same quarter hour as the release start date/time.
- Release Start Date/Time – needed to accurately project the distance that the plume has traveled and the areas affected by the release. This time will be rounded to the quarter hour preceding the time entered (ex. 09:10 would be 09:00).
- Release Stop Date/Time – end of the projected release. The default value for this field is three hours (entered automatically by the program) after the release begins. For most scenarios, this value will be adequate. Do not edit this field unless you do not want a three hour release duration.

NOTE: The Date/Time fields for the program can be changed by high-lighting the entire field or the time portion of the field. You **cannot** change part of the time or date. The Date and Time field uses a pre-formatted configuration. You do not need to enter "/" for dates or ":" for time when entering data.

5.5 Selecting Source Term for EARS

5.5.1 The program will allow you to select from five different source terms:

- Fuel rod gap (typically indicated by RE-30 or RE-31 reading of greater than 1R/hr and less than 300R/hr). This is the default setting for source term.
- Core (typically indicated by RE-30 or RE-31 reading greater than 300R/hr)
- FSAR reactor coolant (RE-30 or RE-31 read less than 1R/hr and known fuel defects have occurred)
- U1 or U2 Reactor Coolant (which is updated every six months)
- Manual (This pathway is only to be used if the defined pathways do not match the release)

5.5.2 For additional information on selecting the appropriate source term, see Appendix 6.1 of EP RB - 9, "Calculation of Release Rate."

5.5.3 Confer with the ESE, TSC engineering, and TSC RP staff, and obtain concurrence on the source term prior to proceeding with the dose calculation.

5.6 Selecting Pathways in EARS

5.6.1 Select the release pathway tab that corresponds to the current accident conditions. When the pathway is selected the screen will access plant information for current radiation monitors and modes of removal that may be applicable to the pathway and allow you to edit or add additional information.

a. Parameters (and options) needed for each pathway are provided in the attachments to this procedure. For assistance in determining the appropriate pathway, refer to:

- EP EF-3, Attachment 6.21, "Leak Path Flow Chart" or,
- PEP EN-1, Attachment 8.7, "Emergency Engineering Guideline Computational Aids."

5.6.2 Confer with the ESE, TSC engineering, and TSC RP staff, and obtain concurrence on the release path prior to proceeding with the dose calculation.

5.6.3 If the release pathway is through the Plant Vent to the atmosphere, select the appropriate EARS tab from the eight red tabs on the menu.

5.6.4 For Plant Vent releases, proceed to attachment identified below for further instructions:

- Containment Purge to Plant Vent (Attachment 9.1)
- Containment to GE/GW to Plant Vent (Attachment 9.2)
- Containment to Fuel Handling Building to Plant Vent (Attachment 9.3)
- Containment Sump to Auxiliary Building to Plant Vent (Attachment 9.4)
- Steam Generator to GE/GW to Plant Vent (Attachment 9.5)
- CVCS to Auxiliary Building to Plant Vent (Attachment 9.6)
- CCW to Auxiliary Building to Plant Vent (Attachment 9.6)
- Spent Fuel Pool to Fuel Handling Building to Plant Vent (Attachment 9.7)

5.6.5 Steam Releases

- Steam Generator Tube Rupture to Atmosphere (Attachment 9.8)

5.6.6 Containment to Atmosphere (not via Plant Vent)

- Design Basis leakage to the atmosphere (Attachment 9.9)

5.6.7 Other - Manually specified release information

- Manual entry of meteorological and release rate information (Attachment 9.11)

5.7 Calculating Release Information (Starting MIDAS)

****

CAUTION: Do not begin an EARS calculation until a release has begun.

****

5.7.1 When you select the "Calculate" button the program will use the release data you have input and the plant meteorological and radiation data as inputs to the MIDAS system to determine offsite dose projections. Before you initiate the MIDAS run EARS will provide a validation screen with the input data you have entered. When the validation screen appears, review the inputs with the Emergency Supervising Engineer.

5.7.2 If the input values are valid go to step 5.7.4.

5.7.3 If the horizontal stability field indicates "8", and all the other Met data fields indicate "0", Click "CANCEL". These "0" values indicate that the "quarter hour" met tower data for this update time has not yet been communicated to EARS.

a. Observe the RMDDT or PDN met data screen to observe when the "quarter hour" update occurs. Once the PDN met data populates with the update time corresponding to the EARS update time, go back to step 5.7.1.

5.7.4 Click "OK" after you have validated the data contained on the input screen. The MIDAS program will launch with the Accident Run Menu selection set to "DOSE PROJECTIONS (MENU A)." The program will automatically print an input report with all the assumptions being used for the calculation.

5.7.5 Click "OK" again to begin calculations. A second input screen (MENU:A) will display the time elements of the calculation. Menu A is the primary method used for performing EARS/MIDAS calculations. The dropdown box allows you to select two other run options:

a. LAST 24 HOUR DOSE (MENU F) – Need more information here. Attachment 9.12, MIDAS Menu F.

b. MANUAL SPREADSHEETS (MENU X) – This method allows you to manually enter meteorological and radiological release data in spreadsheet form. This process can be used for release rates that were calculated manually, not from direct access to the RMS. To perform these calculations, use Attachment 9.13, MIDAS Menu X.

****

CAUTION: Do not change the input parameters that are displayed on this screen.

****

5.7.6 Click "Start Calc." The program will display the TEDE plot.

5.7.7 Click "OK" when the "Print" dialogue box is displayed. A Dose Summary Report will be printed. It contains the information needed to make protective action recommendations based on dose, including current dose rates and projected total doses based on the release duration. This report is also referred to as the "State Report."

5.7.8 Close the report window (click upper right corner X) to return to the MIDAS graphical display. The program will now display the plume with the 4-day TEDE dose on the plot and the legend will contain the highest 4-day TEDE and CDE dose location.

5.7.9 If incorrect assumptions are identified, edit the input data and re-run the calculation using the same update time. Update times are usually entered by default, so you will need to enter the time at the bottom the EARS input screen.

5.7.10 If EARS "crashes" or the system locks-up during calculations, restart the program and enter data for any missing time periods. Data for the earlier updates will still be available. Find the time of the last saved update and re-enter data for each fifteen minute period until you have "Caught-up" to current time.

5.8 MIDAS Options

Once the initial calculation has been performed the EARS program is able to display or provide reports for many other dose assessment parameters. The menu for this information is provided at the bottom of the display. The following section describes these options.

NOTE 1: Options that are available for each selection are designated by colors. Selected items are highlighted in light-green background. After a selection is made option buttons are high-lighted in yellow. The "confirm" button is high-lighted in flashing pink when it is ready to perform a new calculation.

NOTE 2: For most EARS/MIDAS runs you will want to print a 4-day TEDE Dose map (Section 5.8.2) and a CDE Thyroid Dose (Section 5.8.3) map.

5.8.1 Point of Interest (POI)

a. Points of interest are any place on the map (within the plume or plume pathway) that individual data is needed. Estimated dose rates, concentrations or other information can be obtained by loading the appropriate map.

b. To obtain dose information for any POI, first load the map with the type of information you need (TEDE, Thyroid CDE, EDE, etc.)

c. Size the map to an appropriate distance by zooming in or out. This can be done by right-clicking the mouse. This can also be done by drawing a rectangle around the area. Additionally, you may change the scale of the map (See Section 5.8.11).

d. Next, click the "POI" button to enable the function (toggles to "POI Active").

e. Point and click the mouse to the area of interest on the map. The requested information will appear on the screen. You may click multiple areas of the map.

****

CAUTION: The data displayed using the POI function does not contain units. Numerical data for the POIs will be in the same units as the map legend.

****

f. To remove the point of interest data, click the "POI Active" button. This will toggle the button back to "POI" and clear the numerical data from the map.

5.8.2 TEDE Dose/Dose Rates

The following options may be selected for displaying/printing TEDE dose:

a. First select the TEDE button. Button will be high-lighted in light green.

b. Select "integrated dose" or "dose rate" by toggling the yellow "Dose" button.

c. Select the exposure time by toggling the yellow time button. Options for duration are:

- 0.25 hours (15 minute puff release)
- 3 hours - default
- 8 hours
- 24 hours

d. Select graphic or table output by toggling the yellow graphic/table button.

e. Click the flashing pink "Confirm" Button to access the data.

f. Print the screen graphic or tabular data report.

5.8.3 Thyroid CDE Dose/Dose Rates

The following options may be selected for displaying/printing Thyroid CDE dose:

a. First select the Thyroid CDE button. Button will be high-lighted in light green.

b. Select "integrated dose" or "dose rate" by toggling the yellow "Dose" button.

c. Select the exposure time toggling the yellow time button. Options for duration are:

- 0.25 hours
- 3 hours – default
- 8 hours
- 24 hours

d. Select graphic or table output by toggling the yellow graphic/table button (default is graphic).

e. Click the pink "Confirm" Button to access the data.

f. Print the screen graphic (preferred) or tabular data report.

5.8.4 EDE (Effective Dose Equivalent) Dose Rates

The following options may be selected for displaying/printing EDE dose rates:

a. First select the EDE button. Button will be high-lighted in light green.

b. Select the exposure time toggling the yellow time button

- 0.25 hours – default
- 3 hours
- 8 hours
- 24 hours

c. Select graphic or table output by toggling the yellow graphic/table button.

d. Click the pink "Confirm" Button to access the data.

e. Print the screen graphic or tabular data report.

****

CAUTION: If you need to go back to the TEDE or CDE screen you will need to change the exposure time for the display. EDE defaults to 0.25 hour and TEDE/CDE plots should be three hours (TEDE/CDE default) unless you have been using a longer duration. The application will not automatically change this exposure time. Toggle the exposure time button until you have the correct duration.

****

5.8.5 Field Monitors

Field Monitoring estimates are available for the following parameters:

- Gamma
- Gamma + Beta
- Thyroid

They can be printed as tabular data or displayed as a graphic. This information can be used to determine the correlation between estimate field monitoring data and actual field monitoring data.

5.8.6 Population Dose

This function is provided to meet the requirements of NUREG 0654 (Section M.4) for the ability to calculate a population dose (manRem). It is a re-entry/recovery function that is rarely used.

5.8.7 Plume Tracks

This display shows the plume segments at each time interval. These are used by MIDAS to calculated ground deposition. This display does not provide useful information to the ERO other than to identify areas that may need to be monitored by field teams.

5.8.8 Special Reports

a. 4-day TEDE Report - is prepared for each calculation (State Report). This button simply provides another means of getting to the report.

b. Ingestion Summary Report – This report includes information for the following pathways:

- Air concentration
- Skin dose
- Ground contamination
- Cow milk
- Meat concentration
- Vegetation concentration
- Ground shine

c. Met/Rad Summary – Includes isotopic release listing and summary of the meteorological parameters

d. RMP – This function is not currently available

e. Projection Summary – Dose summary versus PAGs for release durations of 0.25, 3, 8, and 24 hours

5.8.9 Ingestion Pathway

a. Five isotopes are considered for ingestion pathway factors:

- I-131
- Cs-134
- Cs-137
- SR-89
- SR-90

b. Seven exposure pathways may be considered for Ingestion Pathway calculations:

- Air concentration (any of the five isotopes listed above)
- Ground deposition (any of the five isotopes listed above)
- Cow Milk (any of the five isotopes listed above)
- Vegetation (any of the five isotopes listed above)
- Meat (any of the five isotopes listed above)
- Skin dose (Integrated skin dose equivalent – 1 year dose) can be calculated for exposure times of 0.25, 3, 8, or 24 hours based on user input)
- Ground Committed Dose
  - Initial
  - 1 day
  - 4 days
  - 1 year
  - 2nd year
  - 50 years

Each isotope can be selected in conjunction with the type of data requested to produce either a table of expected dose or a graphical representation of the expected dose.

5.8.10 X/Q (dispersion [X/Q] and deposition [D/Q] coefficients)

X/Qs may be display as a screen graphic or printed as tabular data. The "Bldg wk" (Building Wake) yellow button cannot be toggled. The X/Qs may be calculated in any of the following modes:

- Undepleted – no deposition is removed from the plume
- Depleted Iodine – deposited iodine is removed from the plume
- Depleted Particulate - deposited particulates are removed from the plume
- Deposited Iodine – deposition rate for iodines
- Deposited particulate – deposition rate for particulates

5.8.11 Changing Map Scale

The map radius is typically set to 20 miles. You can re-set this value by clicking the button marked "__ Miles". Type in the new radius in the dialogue box and click "ENT."

5.8.12 Print Map button

The button with a printer icon can be used to send a screen print to the printer. Click the button once to perform this function. The next dialogue box provides the following options:

- Printer – sends map to local printer
- File – stores JPEG to file. You must enter a file name. The plot will be stored on the server and be able to be viewed by other workstations.
- Email – allows you to send the screen print to an Email address. You must enter the Email address. (This function is not enabled)

After you have made your choice, click "OK."

You may also print the map using a right-click. However, this will not include the legend and input information.

5.8.13 Map Features Button

Information that is displayed on the screen maps can be changed using this option. Not all information on the menu can be displayed and much of the information cannot be displayed in conjunction with other information. In most cases it easiest to remove all options except the ones you wish to view. Also some options must be at a small enough resolution to be viewed. This is particularly true for streets and street names.

The Map Features section also allows you to add emergency information to the map. The following options are available:

- Field Monitoring teams
- Emergency Response Units
- Monitor Locations
- Law Enforcement teams

Text may be attached to the graphics (ex. FMT-1). Once the item is added to the map, you may click and drag the icon to a new location.

a. Click on the Map Features button to add the following features typically used for each MIDAS run:

   1. To view FMT radiation monitoring points on the plume maps, referred to in MIDAS as RMPs (radiation monitoring points), click on the "RMPs" box and select either onsite or offsite points

   2. To view Pressurized Ion Chamber (PIC) locations on the plume maps, click on the "PICs" box.

   3. Click "OK" to return to plume map screen.

5.8.14 Zoom Out Button

This button can be used to view larger sections of the emergency planning zone. You may also zoom (out or in) by right-clicking the mouse. Additionally, you may zoom in by drawing a rectangle with the mouse of the area you wish to view in greater detail.

5.9 Exiting a MIDAS Run (return to EARS input screen)

Select "End Run" from the menu at the bottom of the screen. Three options are available when you have finished a MIDAS run:

5.9.1 Run next time step – Save the current run and initiate the next run (15 minute intervals). A new run can only be initiated after a fifteen minute data averaging period.

5.9.2 Save Run and Exit – Save the current run and return to the EARS interface. This is the standard option for returning to EARS and preparing for the next run. Once saved, the information can be shared with another workstation. You may also recap a previous run after exiting.

5.9.3 Exit without saving – Do not save the current run and return to the EARS interface. If you select this option your current run is not saved and cannot be recapped.

5.10 Exiting EARS

To exit the EARS system, select "quit" from the Menu options at the top of the Input screen.

****

CAUTION: EARS should only be exited using the menu selection. Do not use the "X" close screen. If EARS is exited using the "X" method, the next launch of the program will contain inputs from the previous run.

****

5.11 Other EARS Program Options

5.11.1 MODE

The default mode for EARS to run in is "local." When the program is run in the local mode it cannot be overwritten by users at another workstation.

5.11.2 OPTIONS

- Auto Increment – provides automatic time data for the calculation sequence (every 15 minutes)
- AutoPollMonitors – Toggles on and off for automatically polling information from the plant radiation monitoring system and the meteorological tower. If it is turned off the user can manually enter data into yellow shaded fields.
- Electrical Bus – the program allows you to select the busses that are in service. This information is used to allow you to determine the exhaust flow rate through the plant vent if the flow monitor is not working. The program will only allow you to select fans for busses that are in service. Also, if busses are removed from service some radiation monitors will not be available.
  - Bus F (E-1 Fan, GE/GW Fan)
  - Bus G (E-5 Fan)
  - Bus H (E-2 Fan, E-6 Fan)
  - Bus I (E-3 Fan, E-4 Fan)

5.11.3 VIEW

Three data sources may be viewed under this section:

a. Met Data – Click "View" and "Met Data" to provide a window with the current readings from the primary and back-up meteorological towers. To close the window, re-click "View" and "Met Data."

b. Release Source – Click "View" and "Release Source" to open a window with the current source term (isotopic listing in total curies). To close the window, re-click "View" and "Release Source."

c. Release Rate – Click "View" and "Release Rate" to open a window with the calculated isotopic release rates for the parameters selected (source term and pathway information). To close the window, re-click "View" and "Release Rate."

NOTE: You can view the information on the screen and see the instantaneous release rate calculation, isotopic fractions and current meteorological data with these screens. As selections are made the results are updated instantaneously on these screens. Other EARS/MIDAS functions (Add information for Store [collects data from other time periods] and Recap (used by non-controlling [TSC] station functions. Recap can also be used by the controlling station to look at previous runs.

5.11.4 Store

This Function gathers the release rate and meteorological data into the MIDAS input files and the database without printing a release rate summary or invoking MIDAS. This is normally used when you need to catch up to a current time for a release that started in the past or when wrong assumptions were made initially and need to be corrected. It is not necessary to run MIDAS for each 15 minute period; you can save the incremental periods and then run MIDAS one time to be current.

5.11.5 Recap

The Recap function allows the user to view earlier EARS/MIDAS runs.

a. When the "MIDAS – Accident Dose Calculation" window appears, select the "Recap Previous Run" option.

NOTE: If you invoke the MIDAS calculation then the system will recalculate based on current time. The resulting MIDAS outputs may not match those previously performed due to the time difference (decay and deposition remove isotopes). The use of the RECAP function should be coordinated between the EOF and TSC EARS operators.

b. Next, select the previous run from the list of saved files.

c. Then click "OK" to load the historical data file.

6. RECORDS

None

7. APPENDICES

None

8. REFERENCES

8.1 EP RB-9, "Calculation of Release Rate"

8.2 EP EF-3, "Emergency Operations Facility"

8.3 PEP EN-1, "Emergency Engineering Guideline Computational Aids"

8.4 NUREG 0654, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants"

9. ATTACHMENTS

9.1 "Path 1 - Containment Purge to the Plant Vent," 12/09/05

9.2 "Path 2 - Release to the Plant Vent through the GE/GW Area," 12/09/05

9.3 "Path 3 - Containment Release to the Plant Vent through the Fuel Handling Building," 12/09/05

9.4 "Path 4 - Containment Release to the Plant Vent through Containment Sump and the Auxiliary Building," 12/09/05

9.5 "Path 5 - Steam Generator Release to the GE/GW area and then to the Plant Vent," 02/03/09

9.6 "Path 6 - Plant Vent Release via the CVCS and Auxiliary Building," 12/09/05

9.7 "Path 7 - Plant Vent Release via CCW and the Auxiliary Building," 11/21/05

9.8 "Path 8 - Plant Vent Release via the Spent Fuel Pool and Fuel Handling Building," 11/21/05

9.9 "Path 9 - Steam Generator Tube Rupture to Atmosphere," 02/03/09

9.10 "Path 10 - Design Basis Leak through Containment to Atmosphere," 11/21/05

9.11 "Manually Specified Release," 12/09/05

9.12 "MIDAS Menu F," 12/09/05

9.13 "MIDAS Menu X," 12/09/05

DIABLO CANYON POWER PLANT
EP RB-16
ATTACHMENT 9.1

1 AND 2

TITLE: Path 1 - Containment Purge to the Plant Vent

1. Select Exhaust Fans Status

   The default setting for flow for a release through the Plant Vent is "Use FM 12." FM 12 has a maximum flow rate of approximately 250,000 cfm. If you de-select "Use FM 12" you will be able to select individual fans, which will then be summed to create a total flow rate to the Plant Vent. Fans that can be selected are limited based on the busses in service. Status of busses should be monitored throughout the event.

2. Select Filtration Mechanisms

   No editable filtration mechanisms are provided for this pathway. Containment Purge Exhaust bypasses the plant vent filter trains (charcoal and HEPA) and vents directly to the atmosphere.

3. Select Radiation Monitors to use for the Calculation

   The following radiation monitors are available for use in calculating release rates from this pathway:

   - R-14
   - R-14R
   - R-29
   - R-87

   You may also select a checkbox to use RE-24 when RE-24/24R is running. RE-24 provides better scaling information for a gap release. Before selecting RE-24/24R, ensure that the monitor is operating and on-scale.

4. Set Containment Spray Status (95% reduction of iodine source term).

   Three options are available to describe the use of containment sprays:

   - None – containment sprays have not been used to remove activity from the containment atmosphere.
   - One – One train has been used to remove for removal.
   - Two – Both spray trains have been used.

   If you select one or two pumps you must also enter the time that sprays were started. The program will take a 95% reduction for each time period that fans are running

5. When you have finished entering data for the release path click the "Calculate" button.

6. Return to step 5.7 of this procedure.

DIABLO CANYON POWER PLANT
EP RB-16
ATTACHMENT 9.2

1 AND 2

TITLE: Path 2 - Release to the Plant Vent through the GE/GW Area

Select data for this pathway:

1. Select Exhaust Fans Status

   The default setting for flow for a release through the Plant Vent is "Use FM 12." FM 12 has a maximum flow rate of approximately 250,000 cfm. If you de-select "Use FM 12" you will be able to select individual fans, which will then be summed to create a total flow rate to the Plant Vent. Fans that can be selected are limited based on the Busses in service. Status of busses should be monitored throughout the event.

2. Select Filtration Mechanisms

   No editable filtration mechanisms are provided for this pathway. The exhaust stream cannot be routed through HEPA or charcoal filters.

3. Select Radiation Monitors to use for the Calculation

   The following radiation monitors are available for use in calculating release rates from this pathway:

   - R-14
   - R-14R
   - R-29
   - R-87

   You may also select a checkbox to use RE-24 when RE-24/24R is running. RE-24 provides better scaling information for a gap release. Before selecting RE-24/24R, ensure that the monitor is operating and on-scale.

4. Set Containment Spray Status (95% reduction of iodine source term)

   Three options are available to describe the use of containment sprays:

   - None – containment sprays have not been used to remove isotopes from the containment atmosphere
   - One – One train has been used to remove for removal
   - Two – Both spray trains have been used

   If you select one or two pumps you must also enter the time that sprays were started. The program will take a 95% reduction for each time period that fans are running.

5. When you have finished entering data for the release path click the "Calculate" button.

6. Return to step 5.7 of this procedure.

DIABLO CANYON POWER PLANT
EP RB-16
ATTACHMENT 9.3 **1 AND 2**

TITLE: Path 3 - Containment Release to the Plant Vent through the Fuel Handling Building

Select data for this pathway:

1. Select Exhaust Fan Status

   The default setting for flow for a release through the Plant Vent is "Use FM 12." FM 12 has a maximum flow rate of approximately 250,000 cfm. If you de-select "Use FM 12" you will be able to select individual fans, which will then be summed to create a total flow rate to the Plant Vent. Fans that can be selected are limited based on the Busses in service. Status of busses should be monitored throughout the event.

2. Select Filtration Mechanisms

   No editable filtration mechanisms are provided for this pathway.

3. Select Radiation Monitors to use for the Calculation

   The following radiation monitors are available for use in calculating release rates from this pathway:

   - R-14
   - R-14R
   - R-29
   - R-87

   You may also select a checkbox to use RE-24 when RE-24/24R is running. RE-24 provides better scaling information for a gap release. Before selecting RE-24/24R, ensure that the monitor is operating and on-scale.

4. Set Containment Spray Status (95% reduction of iodine source term)

   Three options are available to describe the use of containment sprays:

   - None – containment sprays have not been used to remove isotopes from the containment atmosphere.
   - One – One train has been used to remove for removal
   - Two – Both spray trains have been used

   If you select one or two pumps you must also enter the time that sprays were started. The program will take a 95% reduction for each time period that fans are running.

5. When you have finished entering data for the release path click the "Calculate" button.

6. Return to step 5.7 of this procedure.

DIABLO CANYON POWER PLANT
EP RB-16
ATTACHMENT 9.4

1 AND 2

TITLE: Path 4 - Containment Release to the Plant Vent through Containment Sump and the Auxiliary Building

Select data for this pathway:

1. Select Exhaust Fan Status

   The default setting for flow for a release through the Plant Vent is "Use FM 12." FM 12 has a maximum flow rate of approximately 250,000 cfm. If you de-select "Use FM 12" you will be able to select individual fans, which will then be summed to create a total flow rate to the Plant Vent. Fans that can be selected are limited based on the Busses in service. Status of busses should be monitored throughout the event.

2. Select Filtration Mechanisms

   Releases through the Auxiliary Building can be filtered using particulate filters (HEPA) or iodine filters (Charcoal) or both.

3. Select Radiation Monitors to use for the Calculation

   The following radiation monitors are available for use in calculating release rates from this pathway:

   - R-14
   - R-14R
   - R-29
   - R-87

   You may also select a checkbox to use RE-24 when RE-24/24R is running. RE-24 provides better scaling information for a gap release. Before selecting RE-24/24R, ensure that the monitor is operating and on-scale.

4. When you have finished entering data for the release path click the "Calculate" button.
5. Return to step 5.7 of this procedure.

DIABLO CANYON POWER PLANT
EP RB-16
ATTACHMENT 9.5

1 AND 2

TITLE: Path 5 - Steam Generator Release to the GE/GW area and then to the Plant Vent

Select data for this pathway:

1. Exhaust Fans:

   The default setting for flow for a release through the Plant Vent is "Use FM 12." FM 12 has a maximum flow rate of approximately 250,000 cfm. If you de-select "Use FM 12" you will be able to select individual fans, which will then be summed to create a total flow rate to the Plant Vent. Fans that can be selected are limited based on the Busses in service. Status of busses should be monitored throughout the event.

2. Filtration:

   No editable filtration mechanisms are provided for this pathway.

3. Radiation Monitors

   The following radiation monitors are available for use in calculating release rates from this pathway:

   - R-14
   - R-14R
   - R-29
   - R-87

   You may also select a checkbox to use RE-24 when RE-24/24R is running. RE-24 provides better scaling information for a gap release. Before selecting RE-24/24R, ensure that the monitor is operating and on-scale.

4. Water Level in the Affected Steam Generator

   Three options are provided for water level in the Steam Generator:

   - Flooded (>96% level): all iodines and particulates are assumed to be released.
   - Normal (13% to 96% level): 1% of iodines and 1% of particulates are assumed to be released.
   - Empty (<13% level): 10% of the iodines and 1% of the particulates are assumed to be released.

5. When you have finished entering data for the release path click the "Calculate" button.
6. Return to step 5.7 of this procedure.

DIABLO CANYON POWER PLANT
EP RB-16
ATTACHMENT 9.6

1 AND 2

TITLE: Path 6 - Plant Vent Release via the CVCS and Auxiliary Building

Select data for this pathway:

1. Select Exhaust Fan Status

   The default setting for flow for a release through the Plant Vent is "Use FM 12." FM 12 has a maximum flow rate of approximately 250,000 cfm. If you de-select "Use FM 12" you will be able to select individual fans, which will then be summed to create a total flow rate to the Plant Vent. Fans that can be selected are limited based on the Busses in service. Status of busses should be monitored throughout the event.

2. Select Filtration Mechanisms

   Releases through the Auxiliary Building can be filtered using particulate filters (HEPA) or iodine filters (Charcoal) or both.

3. Select Radiation Monitors to use for the Calculation

   The following radiation monitors are available for use in calculating release rates from this pathway:

   - R-14
   - R14R
   - R-29
   - R-87

   You may also select a checkbox to use RE-24 when RE-24/24R is running. RE-24 provides better scaling information for a gap release. Before selecting RE-24/24R, ensure that the monitor is operating and on-scale.

4. When you have finished entering data for the release path click the "Calculate" button.

5. Return to step 5.7 of this procedure.

DIABLO CANYON POWER PLANT
EP RB-16
ATTACHMENT 9.7 **1 AND 2**

TITLE: Path 7 - Plant Vent Release via CCW and the Auxiliary Building

Select data for this pathway:

1. Select Exhaust Fans Status

   The default setting for flow for a release through the Plant Vent is "Use FM 12." FM 12 has a maximum flow rate of approximately 250,000 cfm. If you de-select "Use FM 12" you will be able to select individual fans, which will then be summed to create a total flow rate to the Plant Vent. Fans that can be selected are limited based on the Busses in service. Status of busses should be monitored throughout the event.

2. Select Filtration Mechanisms

   Releases through the Auxiliary Building can be filtered using particulate filters (HEPA) or iodine filters (Charcoal) or both.

3. Select Radiation Monitors to use for the Calculation

   The following radiation monitors are available for use in calculating release rates from this pathway:

   - R-14
   - R14R
   - R-29
   - R-87

   You may also select a checkbox to use RE-24 when RE-24/24R is running. RE-24 provides better scaling information for a gap release. Before selecting RE-24/24R, ensure that the monitor is operating and on-scale.

4. When you have finished entering data for the release path, click the "Calculate" button.

5. Return to step 5.7 of this procedure.

DIABLO CANYON POWER PLANT
EP RB-16
ATTACHMENT 9.8 **1 AND 2**

TITLE: Path 8 - Plant Vent Release via the Spent Fuel Pool and Fuel Handling Building

Select data for this pathway:

1. Select Exhaust Fan Status

   The default setting for flow for a release through the Plant Vent is "Use FM 12." FM 12 has a maximum flow rate of approximately 250,000 cfm. If you de-select "Use FM 12" you will be able to select individual fans, which will then be summed to create a total flow rate to the Plant Vent. Fans that can be selected are limited based on the Busses in service. Status of busses should be monitored throughout the event.

2. Select Filtration Mechanisms

   Releases through the Auxiliary Building can be filtered using particulate filters (HEPA) or iodine filters (Charcoal) or both.

3. Select Radiation Monitors to use for the Calculation

   The following radiation monitors are available for use in calculating release rates from this pathway:

   - R-14
   - R14R
   - R-29
   - R-87

   You may also select a checkbox to use RE-24 when RE-24/24R is running. RE-24 provides better scaling information for a gap release. Before selecting RE-24/24R, ensure that the monitor is operating and on-scale.

4. When you have finished entering data for the release path click the "Calculate" button.
5. Return to step 5.7 of this procedure.

DIABLO CANYON POWER PLANT
EP RB-16
ATTACHMENT 9.9 **1 AND 2**

TITLE: Path 9 - Steam Generator Tube Rupture to Atmosphere

Select data for this pathway:

1. Select Affected Steam Generator

   Select the number of the affected Steam Generator (1-4). The radiation monitor (RM-71-74) for the affected steam generator will be used for performing calculations.

2. Select Release Flow Parameters

   The release flow for this pathway may be determined using either of the following methods:

   - Flow monitor input:
     - Check "FM Input" checkbox
     - Enter the flow rate in "Release Flow Rate" box in lbm/hr (minimum flow rate is 4e5 lbm/hr)
   - Use 10% safety valve
     - Check "10% safety" checkbox
     - Select the Percent demand from the "Pct Demand" dropdown box. You may need to contact the Control Room to get this information.
     - Select which Safety valves are open (1-5)

3. Water Level

   Three options are provided for water level in the Steam Generator:

   - Flooded (>96% level): all iodines and particulates are assumed to be released.
   - Normal (13% to 96% level): 1% of iodines and 1% of particulates are assumed to be released.
   - Empty (<13% level): 10% of the iodines and 1% of the particulates are assumed to be released.

   The water level is used to set the partitioning factors for iodines and particulates in the pathway.

4. When you have finished entering data for the release path, click the "Calculate" button.
5. Return to step 5.7 of this procedure.

DIABLO CANYON POWER PLANT
EP RB-16
ATTACHMENT 9.10 **1 AND 2**

TITLE: Path 10 - Design Basis Leak through Containment to Atmosphere

This pathway is used to estimate dose resulting from small (design basis) leaks in penetrations in containment.

****

CAUTION: this method should only be used for an unknown release path where PICs or off-site monitoring indicates an unmonitored release is in progress.

****

Select data for this pathway:

1. Set Containment Spray Status (95% reduction of iodine source term)

   Three options are available to describe the use of containment sprays:

   - None – containment sprays have not been used to remove isotopes from the containment atmosphere.
   - One – One train has been used to remove for removal.
   - Two – Both spray trains have been used.

   If you select one or two pumps you must also enter the time that sprays were started.

2. Radiation Monitors

   Either of the containment high range monitors (RM-30 or RM-31) may be used for this calculation. Select the toggle button for the monitor you wish to use. The program will use the current reading for the monitor to determine release rates. You may also enter a value in the field.

3. Core Damage Assessment

   This field is not editable. An estimate of core damage (% of source term) is provided based on the readings on the containment high-range monitors.

4. Return to step 5.7 of this procedure.

DIABLO CANYON POWER PLANT
EP RB-16
ATTACHMENT 9.11

1 AND 2

TITLE: Manually Specified Release

This section of EARS allows you to create a release pathway if the accident does not fit one of the ten established pathways.

1. Select the "Manually Specify" data entry tab
2. Select a source term appropriate for the event
3. Select a volume that the source term will be diluted by prior to release
   a. Specify a volume
   b. Reactor Coolant System volume
   c. Containment
4. Select a percentage of the source term that is going to be released to the dilution volume
5. Determine the partitioning factors for each radionuclide group (fraction of the group that will be retained in the dilution volume)
6. Determine the clean-up factors for the radionuclide groups (fraction of the group that will be retained by any cleanup process that may be applied to the release (filters)
7. Specify the flow rate for the release to the environment
8. Specify the flow rate units (the system will convert the units to standard units)
9. When you have finished entering data, initiate the calculation by clicking "Calculate."
10. Return to step 5.7 of this procedure.

DIABLO CANYON POWER PLANT
EP RB-16
ATTACHMENT 9.12

1 AND 2

TITLE: MIDAS Menu F

1. If you are starting from the EARS Main Menu, click "Calculate." If you are starting from the "MIDAS – Accident Dose Calculation."
2. Click "OK" to accept the meteorological data as presented or edit as necessary.
3. Click "Start Calc." The program will display a dialog box for the printer.
4. Click "OK" to print the Dose Summary Report.
5. Click the upper-right-hand "X" to close the report. This will return you to the plot of the 24 hour report.
6. To print a copy of the plot use the printer icon.
7. To return to the EARS Main Input screen, click "End Run."

DIABLO CANYON POWER PLANT
EP RB-16
ATTACHMENT 9.13

1 AND 2

TITLE: MIDAS Menu X

This methodology may be used to generate dose projections when the RMS is not available.

1. After starting the MIDAS program, select "MANUAL SPREADSHEETS (MENU X).
2. Review the first data panel (Data Source), make any necessary changes and select the "Next" arrow.
3. Review the second data panel, make any necessary changes and select the "Next" arrow.
4. Select "isotopic spreadsheet" or "isotopic preset spreadsheet." If you chose the preset option you will need to also make a selection from the available spreadsheets.
5. Click "Confirm."
6. Select "New" or "Edit Last" for the spreadsheet to edit. "New" will overwrite the previous version of the spreadsheet. Edit Last will allow you to edit or update the stored spreadsheet.
7. Click "OK" to open the spreadsheet for meteorological data.
8. Enter data for the release period for all meteorological parameters.
9. Click "OK" when finished.
10. Enter isotopic release rates for all isotopes that have a calculated release rate. Enter data for each time period that information is available.
11. Click "OK" when finished.
12. Review Menu X input, and then click "Next."
13. Click "Start Calc."
14. Click "OK" to print results.

TITLE: Release of Airborne Radioactive Materials Initial Assessment

03/13/09
EFFECTIVE DATE

PROCEDURE CLASSIFICATION: QUALITY RELATED

1. SCOPE

1.1 This procedure describes the steps to be taken by on-shift personnel to initially evaluate the off-site consequences of an accidental airborne release that may result in Emergency Plan Activation.

1.2 It does not describe the operation of the plant equipment necessary to terminate or minimize the release. This latter subject is covered in the appropriate E, ECA, and FR series Emergency Procedures for the particular release mechanism.

2. DISCUSSION

2.1 An accidental airborne release of radioactive materials that may result in site boundary dose rates in excess of the limits specified in the EP G-1 shall require a prompt initial assessment by the operating staff. This initial release rate and dose assessment is performed using either the Plant Data Network (PDN) program "EPR2net", or manually using Section 7 of this procedure.

2.2 This procedure shall only be used by Control Room personnel to perform initial accident dose assessments. This procedure shall not be used to evaluate compliance with Technical Specification limits during planned effluent releases conducted as part of normal plant operations. The methodology contained in this procedure is intended to provide a rapid and conservative calculation of the projected off-site doses due to an accidental release of airborne radioactive materials. More advanced methodologies are contained in procedures EP RB-9 and EP RB-11 or the appropriate chemistry procedures.

3. DEFINITIONS

3.1 Accidental Release: A release of radioactive material unrelated to any planned effluent release evolutions.

3.2 Committed Dose Equivalent (CDE): The dose to the organs or tissues that would be received from an intake of radioactive material by an individual during the 50 years following the intake.

3.3 Committed Effective Dose Equivalent (CEDE): The sum of the products of the weighting factors applicable to each of the body organs or tissues that are irradiated and the CDE to these organs or tissues.

3.4 Deep Dose Equivalent (DDE): Dose associated with exposure of the whole body (depth of 1 cm).

3.5 Total Effective Dose Equivalent (TEDE): The sum of the DDE (for external exposure) and CEDE (for internal exposure).

3.6 TEDE Rate: The time rate of change of Total Effective Dose Equivalent as a function of immersion and inhalation exposure time.

3.7 Thyroid CDE Rate: The time rate of change of Thyroid Committed Dose Equivalent as a function of immersion and inhalation exposure time.

4. RESPONSIBILITIES

4.1 Emergency Evaluation Coordinator (EEC) is responsible for performing an initial assessment of an airborne radiological release when directed by the ISEC.

4.2 Interim Site Emergency Coordinator (ISEC) is responsible for determining when an assessment is needed and directing the EEC to implement this procedure based on emergency evaluation priorities.

5. PREREQUISITES

5.1 Unified Dose Assessment Center (UDAC) is not activated and performing the function of radiological assessment.

5.2 Interim Site Emergency Coordinator (ISEC) has determined, based on plant accident conditions or symptoms of an accidental radiological release, that an initial assessment of projected off-site doses has priority over other actions being performed by the EEC.

The following listed symptoms indicate that an airborne release may be occurring from within the RCA as guidance to the ISEC:

- There is actual or suspected leakage of water, steam, or noncondensible gases from any vessel or piping system containing primary coolant, liquid radwaste, or gaseous radwaste.
- Damage occurs to a submerged, irradiated fuel assembly with the resultant release of significant quantities of noncondensible gases.
- Alarms occur on in-plant continuous air monitors (CAM)s.
- A fire occurs involving radioactive materials.[Ref 11.8]
- Verified alarm on radiation monitors RE-14/14R, RE-28/28R, RE-29, RE-15/15R, or RE-24/24R.
- A major radioactive material spill occurs.

6. PRECAUTIONS

6.1 Do not use SPDS to obtain RMS readings. Radiological Monitor readings off SPDS may be based on different units of measurement than required as input to the calculations.

6.2 If the Main Condenser is available during a SGTR event with a stuck open Safety Relief or 10% Steam Dump to atmosphere, there are two release pathways until the affected SG is isolated. The MSL monitor reading on the affected steam generator encompasses the total release rate of the simultaneous release paths.

6.3 Default release rates are extremely conservative and may result in higher classifications or PARs than would be warranted if actual release indications were available.

6.4 N-16 will be detected on the MSL Radiation Monitors while at power and may cause a false high off-site dose calculation.

6.5 This procedure shall not be used to evaluate compliance to Technical Specifications during planned effluent releases. Such evaluations shall be performed by the Chemistry Department.

6.6 Fuel Handling Accident (FHA) in Containment with Equipment Hatch open is a special case. Use the analyzed default dose rates and doses listed in Attachment 10.1 and go directly to EP G-1 for comparison to the Emergency Action Levels (EALs).

6.7 For plant vent releases, including short duration puff releases such as a ruptured gas decay tank, TRS values for RM-14/14R (cpm) and RM-87 (amps) should be verified and the peak value used for performing the long hand EP R-2 calculation using attachments to this procedure.

7. INSTRUCTIONS

This calculation can be performed using the Plant Data Network (PDN) program "EPR2net" or by long hand, as follows:

7.1 Release Rate Calculations

7.1.1 Obtain a working copy of Attachment 10.1.

7.1.2 Determine release source location as Plant Vent, Atmospheric Steam Release, or Unmonitored.

****

CAUTION: Do NOT use SPDS to obtain radiation monitor readings.

****

7.1.3 Gather and record the required information in accordance with the appropriate section of the form.

NOTE: Plant Vent Extended Range Rad Monitor RE-87 will automatically activate if the Normal Range Gas Monitors RE-14/14R approach their maximum reading.

7.1.4 Perform the required calculation to determine the release rate of Total Effluent and record the results in both this Attachment and Attachment 10.2.

7.1.5 If it is not possible to calculate a release rate, refer to the "Default Release Rates" on Page 3 of Attachment 10.1 and choose the most appropriate value for input to Attachment 10.2. For an FHA in containment with equipment hatch open, use default dose rates and doses from Attachment 10.1 and go directly to EP G-1 for comparison to the EALs.

7.2 Off-Site Dose Calculations

Calculations may be performed using the Plant Data Network (PDN) program "EPR2net," or by long hand, as follows:

7.2.1 Obtain a working copy of Attachment 10.2.

7.2.2 Gather and record the required information in accordance with the appropriate section of the form.

NOTE: Plant Process Computer (PPC) Meteorological Data turn on codes are "METP" (Primary Data) and "METB" (Back-up Data).

7.2.3 Determine the appropriate activity source term and circle the associated Dose Conversion Factor (DCF) to be used in Section 4A and 4B.

7.2.4 Perform the required calculations to determine the TEDE and Thyroid CDE Rates.

7.2.5 Project the Release Duration in hours as input to determining projected doses.

7.2.6 If a duration cannot be projected, use the Default Duration of 3 hours.

7.2.7 Perform the required calculations to determine the TEDE and Thyroid CDE at the Site Boundary (800 meters).

7.2.8 Obtain an independent verification of your calculation whenever time permits to confirm no errors or incorrect assumptions about plant conditions.

7.3 Reporting the Results

7.3.1 REFER TO EP G-1 and compare the results of the above calculations with the Emergency Action Levels.

7.3.2 REFER TO EP RB-10 and compare the results of the dose calculations with the PAR determination criteria.

7.4 Advise the ISEC of any EAL thresholds that are exceeded based on site boundary dose rates and doses, or the need to revise PARs due to changing conditions.

7.5 Continuous Actions

7.5.1 As directed by the ISEC, continue to perform assessment of airborne releases to support evaluation of EAL status and PARs by repeating the above instructions.

7.5.2 Contact Chemistry to request:

a. A sample of the radioactive effluent (if possible) and in-plant airborne activity.

b. A confirmatory assessment of the site boundary dose rate from the release.

8. RECORDS

8.1 All checklists generated during activation of the EOF for drills and exercises are non-quality Good Business Records and shall be retained by Emergency Planning Group for three years.

8.2 All checklists generated during activation of the EOF for a real event are non-quality records and shall be retained in RMS in accordance with AD10.ID2.

9. APPENDICES

None

10. ATTACHMENTS

10.1 "Release Rate Calculations," 02/03/09

10.2 "Off-Site Dose Calculations," 08/05/94

10.3 "EPR2NET Application," 10/20/08

10.4 "Plant Vent Release," 10/20/08

10.5 "Atmospheric Steam Release," 10/20/08

11. REFERENCES

11.1 EP G-1, "Accident Classification and Emergency Plan Activation."

11.2 EP G-2, "Activation and Operation of the Interim Site Emergency Organization (Control Room)."

11.3 EP M-6, "Fire."

11.4 EP RB-9, "Calculation of Release Rate."

11.5 EP RB-10, "Protective Action Recommendations."

11.6 EP RB-11, "Emergency Off-site Dose Calculations."

11.7 EP RB-12, "Mid and High Range Plant Vent Radiation Monitors."

11.8 AR A0595224, "PPC EPR-2 Not Valid for FHA in Containment with Hatch Open"

11.9 PG&E Calculation PAM-0-04-517, Rev. 4, 4/6/97 "Steam Generator Narrow Range Level Uncertainty."

11.10 PG&E Calculation STA-160, Freq., "Estimate of Expected Exposures Associated with a Fuel Handling Accident with Containment Open."

11.11 NRS-RES Calculation No. RA 93-12, New Dose Conversion Factors for EP R-2 and RB-11, Validation and Verification, Rev. 1, 12/15/93.

11.12 NOS-RECE Calculation No. RA 93-04, EP RB-9, Calculation of Release Rate, Rev. 7 and R-2, Release of Airborne Radioactive Materials, Rev. 12, Validation and Verification, Rev. 0, 4/12/93.

11.13 SH&ES Calculation No. EP-94-01, Rev 0, EP R-2, Release of Airborne Radioactive Materials, Rev 17, Validation and Verification.

DIABLO CANYON POWER PLANT
EP R-2
ATTACHMENT 10.1

1 AND 2

TITLE: Release Rate Calculations

PLANT VENT RELEASE

1. **GENERAL INFORMATION**

Date: _____ Time: _____ Assessment No. _____

Assessment By: _____ Unit Releasing _____

2. **PLANT VENT FLOW RATE DETERMINATION**

A. DIRECT - Plant Vent Flow Rate FR-12 (0-30x10^4 CFM (CFM) = _____ (CFM)

OR

B. ALTERNATE - Operating Ventilation Equipment

	(Max No. possible)	#Fans		(CFM/Fan)		
FHB Exhaust	(1)	_____	x	35,750	= _____	(CFM)
Aux Bldg Exhaust	(2)	_____	x	73,500	= _____	(CFM)
GE/GW Area	(1)	_____	x	25,000	= _____	(CFM)
Cont. Purge	(1)	_____	x	55,000	= _____	(CFM)
Cont. Hydrogen	(1)	_____	x	300	= _____	(CFM)

Plant Vent Flow Rate = _____ (CFM)

3. **RELEASE RATE CALCULATION**

****

CAUTION: Do NOT use SPDS to obtain monitor readings.

****

A. NOBLE GAS RELEASE RATE

	Circle Monitor Used	Reading (Units)		Conversion Factor		Plant Vent Flow Rate (CFM)	Noble Gas Release Rate (Ci/sec)
Primary	RE-14/14R/87	_____	µCi/cc	x 4.72E-04	x	_____	=
Backup	RE-29	_____	mR/hr	x 4.72E-06	x	_____	

B. TOTAL EFFLUENT RELEASE RATE

NOTE: Refer to Page 3 for criteria in choosing RCS, GAP, or CORE below.

Noble Gas Release Rate (Ci/sec)		Total Effluent Conversion Factor	Total Effluent Release Rate (Ci/sec)
_____	x	1.00 (RCS) 1.11 (GAP) 1.50 (CORE)	=

NOTE: If it is not possible to calculate a release rate, refer to the DEFAULT RELEASE RATES on Page 3 of this attachment.

GO TO ATTACHMENT 10.2

EP R-2 (UNITS 1 AND 2)
ATTACHMENT 10.1

TITLE: Release Rate Calculations

1. **GENERAL INFORMATION** **ATMOSPHERIC STEAM RELEASE**

Date: _____ Time: _____ Assessment No. _____

Assessment By: _____ Unit Releasing _____

****

CAUTION: When critical, N-16 activity seen by MSL Rad Monitors causes invalid readings for offsite dose. Post-trip, RE-7X reading is valid if the RE-7X monitor showed an initial N-16 response, or responds to checksource.

****

NOTE: If it is not possible to calculate a release rate, refer to the DEFAULT RELEASE RATES on Page 3.

2. **STEAM RELEASES** - Use this form to calculate steam releases to the atmosphere WHEN NOT critical.

A. Required Information (RUPTURED GENERATOR ONLY)

Check Ruptured S/G	MSL Rad Monitor	Reading (cpm)	S/G Lvl Narrow Range	Level (%)	S/G Flow Rate	Flow Rate (lbs/hr) If <4E5 use 4E5
[ ] SG 1	RE-71	_____	LI-517	_____	FI-512	_____
[ ] SG 2	RE-72	_____	LI-527	_____	FI-522	_____
[ ] SG 3	RE-73	_____	LI-537	_____	FI-532	_____
[ ] SG 4	RE-74	_____	LI-547	_____	FI-542	_____

B. Alternate Steam Flow Rate (Only if the RUPTURED S/G Flow Rate is otherwise not available)

Valve Type	# Valves Lifted		Capacity (lbs/hr)		Flow Rate (lbs/hr)
10% Steam Dump (1 per S/G)	_____	x	4.0E+05	=	_____
Safety Reliefs (5 per S/G)	_____	x	8.5E+05	=	_____

Total Steam Flow Rate (lbs/hr) [=] (lbs/hr)

3. **RADIATION MONITOR FACTORS** (Determined based on S/G NR Level indication) (Enter in Section 4 below.)

S/G Level Narrow Range	EMPTY < 13%	NORMAL 13% - 96%	FLOODED > 96%
Monitor Factor	6.08E-10	6.75E-10 (DEFAULT)	3.07E-10

4. **RELEASE RATE CALCULATIONS**

A. TOTAL EFFLUENT RELEASE RATE (RE-7x)

MSL Monitor Reading (cpm)		Flow Rate (lbs/hr)		Monitor Factor	Total Effluent Release Rate (Ci/sec)
_____	x	_____	x	_____	[=]

GO TO ATTACHMENT 10.2

EP R-2 (UNITS 1 AND 2)
ATTACHMENT 10.1

TITLE: Release Rate Calculations

1. SOURCE TERM SELECTION AND DEFAULT RELEASE RATES

NOTE: Use default release rate only if actual data is not available or if the release is not being monitored.

A. Check the accident type which most closely resembles the current event.

	Accident Source	Default Release Rate (Ci/sec)	Condition	Source Term
[ ]	LOCA (w/ core melt)	1.74 E+1	RE-30 or 31 >300R/hr	CORE
[ ]	LOCA (w/o core melt)	5.74 E+0	RE-30 or RE-31 <300R/hr RE-30 or RE-31 not on scale	GAP RCS
[ ]	Main Steam Line Break	8.61 E-3		RCS
[ ]	Feedwater Line Break	8.61 E-3		RCS
[ ]	Blackout	8.62 E-1		RCS
[ ]	Locked Rotor	1.57 E-2		GAP
[ ]	FHB Accident	1.45 E+1		GAP
[ ]	Rod Ejection	1.08 E-2		GAP
[ ]	GDT Rupture	4.14 E+1		RCS
[ ]	LHUT Rupture	3.10 E+1		RCS
[ ]	VCT Rupture	8.29 E-2		RCS
[ ]	S/G Tube Rupture	1.65 E+0	NR S/G Level <13% NR S/G Level 13-96% NR S/G Level >96%	SG - Empty SG - Normal SG - Flooded
[ ]	Containment FHA Accident with Equip. Hatch Open	S.B. Dose Rates S.B. Doses	TEDE = 13.4 mrem/hr Thy. CDE = 51.4 mrem/hr TEDE = 6.7 mrem Thy. CDE = 25.7 mrem	Go Directly to EP G-1

B. Record the Default Release Rate in Attachment 10.2, Section 4 and use the DCF choice that is listed for the specific accident source above.

GO TO ATTACHMENT 10.2

DIABLO CANYON POWER PLANT
EP R-2
ATTACHMENT 10.2

1 AND 2

TITLE: Off-Site Dose Calculations

1. **GENERAL INFORMATION**

Date: _____ Time: _____ Assessment No. _____

Assessment By: _____ Unit Releasing _____

2. **METEOROLOGICAL DATA** - PPC (Plant Process Computer)

Turn On Codes for Met Data are "METP" (Primary Data) or "METB" (Back-up Data)

Parameter	Reading	Units	DEFAULT
Wind Speed (10 Meter Level)	_____	meters/sec	
Wind Direction (10 Meter Level)	_____	Degrees	
Site Boundary X/Q (0.8 km)	_____	Sec/m^3	5.29E-04

3. **DCF Determination** - Select the most appropriate source term for the DCF using the criteria in Attachment 10.1. Circle the corresponding DCF in Section 4 below.

4. **DOSE CALCULATIONS** - (From data calculated using Attachment 10.1)

A. TOTAL EFFECTIVE DOSE EQUIVALENT (TEDE)

Total Effluent or Default Release Rate (Ci/sec)		Site Boundary X/Q (0.8 km) (Sec/m^3)		DCF (circle one)	TEDE Rate (mrem/hr)		Projected Release Duration (hr) (DEFAULT 3 hrs)	TEDE (mrem)
_____	x	_____	x	1.1E + 05 (RCS) 3.0E + 06 (Gap) 1.1E + 07 (Core) 1.1E + 05 (SG-Empty) 4.3E + 04 (SG-Normal) 9.3E + 05 (SG-Flooded)	=	x	_____	=
Attachment 10.1								

B. THYROID COMMITTED DOSE EQUIVALENT (CDE) (DO NOT COMPLETE FOR GDT, LHUT, OR VCT RUPTURE)

Total Effluent or Default Release Rate (Ci/sec)		Site Boundary X/Q (0.8 km) (Sec/m^3)		DCF (circle one)	Thyroid CDE Rate (mrem/hr)		Projected Release Duration (hr) (DEFAULT 3 hrs)	Thyroid CDE (mrem)
_____	x	_____	x	1.5E + 06 (RCS) 6.5E + 07 (Gap) 7.7E + 07 (Core) 1.5E + 06 (SG-Empty) 1.5E + 05 (SG-Normal) 1.4E + 07 (SG-Flooded)	=	x	_____	=
Attachment 10.1								

5. **REPORTING THE RESULTS** - (Refer to Section 7.3 of Instructions for details)

A. Refer to EP G-1 for EAL criteria.

B. Implement EP RB-10 for PAR criteria

DIABLO CANYON POWER PLANT
EP R-2
ATTACHMENT 10.3 **1 AND 2**

TITLE: EPR2NET Application

1. Start EPR2NET
   a. OPEN the epr2net application:
      1) Click on the "epr2net" icon on the PDN Console
      2) IF icon is unavailable,
         THEN type <http://172.16.20.2/epr2net> in the Internet Explorer "address" field and press ENTER.
   b. Select the Unit Specific release path button Plant Vent or Steam Release
   c. For Plant Vent Release data entry, GO TO Attachment 10.4.
   d. For Atmospheric Steam Release data entry, GO TO Attachment 10.5.

DIABLO CANYON POWER PLANT
EP R-2
ATTACHMENT 10.4 **1 AND 2**

TITLE: Plant Vent Release

PLANT VENT RELEASE

DATA ENTRY:

1. General Information
   a. Enter the "Assessment" number
2. Plant Vent Flow Rate Determination:
   a. Validate "DIRECT" plant vent flow rate indicates "OK" in the box to the right of the flow rate.
   b. IF the box says: "UNREL" instead of "OK",
      THEN Click on "ALTERNATE", and
      Place a check mark in the box next to all the fans that are operating.
3. Release Rate Calculation:
   a. Noble Gas Release Rate

      For Ongoing Release:

      1) IF on scale,
         AND indicates "OK" to the right of the activity value,
         THEN select RM-14 or RM-14R, which ever is higher
      2) IF both RM-14 and RM-14R indicate "UNREL"
         AND RM-87 equals 1E-12 amps
         THEN select RM-29.
      3) IF RM-14 or RM-14R is off scale (5E6 cpm is top of scale)
         AND indicates "OK" to the right of the activity value,
         THEN select RM-87 if it indicates "OK" to the right of the RM-87 activity value.
      4) IF RM-87 indicates "UNREL" instead of "OK",
         THEN select RM-29.

      For a Fuel Handling accident or Tank Rupture Release:

      1) Attempt to perform the calculation at the peak monitor reading (RM-14, RM-87 or RM-29 as appropriate) for the duration of the release.

   b. Release Rate Calculation, Total Effluent Release Rate
      1) Select the appropriate source term (click on "HELP" for guidance).
      2) Single Click the "NEXT" button at the bottom of the page. This will open a Dose Calculations window.

****

CAUTION: Every time you click the "NEXT" button at the bottom of this page, the program creates another Dose Calculations window.

****

      3) IF more than one Dose Calculations window is open,
         THEN close all open Dose Calculations windows and click the "NEXT" button at the bottom of the Plant Vent Release page. This will open a Dose Calculations window.

EP R-2 (UNITS 1 AND 2)
ATTACHMENT 10.4

TITLE: Plant Vent Release

DOSE CALCULATIONS

DATA ENTRY:

1. General Information
   a. Validate current date and time, assessment number, and unit releasing number are the same as the Plant Vent Release page.
2. Meteorological Data – PPC
   a. Select Desired Met Data (Primary or Backup)
      1) Primary is preferred to backup.
      2) Do not select if any of the 3 parameters indicates "UNREL"
      3) If both met towers have "UNREL" data, perform a long hand calculation using Attachment 10.1.
3. DCF Determination
   a. This carries over from the Plant Vent Release page (do not edit).
4. Dose Calculations, Total Effective Dose Equivalent(TEDE)
   a. Total Effective Dose Equivalent (TEDE)
      1) Verify the projected release duration (default 3 hours).
         a) Enter 0.25 hours for a release under 15 minutes.
      2) Enter the calculated TEDE rate in block 10 of the ENF if off-site dose rates are not available form FMTs or PICs.
      3) Compare the release duration "Total TEDE" against dose values in EALs RG1.2 and RS.1.2 for classification.
   b. Thyroid Committed Dose Equivalent (CDE)
      1) Compare the release duration "Total CDE" against dose values in EALs RG1.2 and RS.1.2 for classification.
5. Print the Plant Vent Release page and the Dose Calculations page.
6. Enter the Assessors name at the top of each page.
7. Submit the calculation to the ISEC for approval. Signature on each page.

DIABLO CANYON POWER PLANT
EP R-2
ATTACHMENT 10.5

1 AND 2

TITLE: Atmospheric Steam Release

ATMOSPHERIC STEAM RELEASE

DATA ENTRY:

1. General Information
   a. Enter the "Assessment" number.
2. Steam Release Rate
   a. Select the faulted ruptured SG.
   b. Type in the number of relief "valves lifted"
3. Radiation Monitor Factors
   a. This section is Information only – no editable fields.
4. Release Rate Calculations
   a. No entry required in this section. The monitor factor is changed based on SG level (%) indication in Section 2, Steam Release Rate above. This carries over to the DCF section on the Dose Calculations page.
5. Single click the "NEXT" button at the bottom of the page. This will open a Dose Calculations window.

****

CAUTION: Every time you click the "NEXT" button at the bottom of this page, the program creates another Dose Calculations window.

****

6. IF more than one Dose Calculations window is open,
   THEN close all open Dose Calculations windows and click the "NEXT" button at the bottom of the Atmosphere Steam Release page. This will open a new Dose Calculations window.

EP R-2 (UNITS 1 AND 2)
ATTACHMENT 10.5

TITLE: Atmospheric Steam Release

DOSE CALCULATIONS

DATA ENTRY:

1. General Information
   a. Validate current date and time, assessment number, and unit releasing number are the same as the Atmospheric Steam Release page.
2. Meteorological Data – PPC
   a. Select Desired Met Data (Primary or Backup)
      1) Primary is preferred to backup.
      2) Do NOT select if any of the 3 parameters indicates "UNREL"
      3) If both met towers have "UNREL" data, perform a long hand calculation using Attachment 10.1.
3. DCF Determination
   a. This carries over from the Atmospheric Steam Release page (do not edit). It is based on the PDN input for SG Narrow Range (NR) water level
4. Dose Calculations, Total Effective Dose Equivalent(TEDE)
   a. Total Effective Dose Equivalent (TEDE)
      1) Verify the projected release duration (default 3 hours)
         a) Enter 0.25 hours for a "puff" release under 15 minutes.
      2) Enter this calculated TEDE rate in block 10 of the ENF if off-site dose rates are not available from FMTs or PICs
      3) Compare the release duration "Total TEDE" against dose values in EALs RG1.2 and RS.1.2 for classification.
   b. Thyroid Committed Dose Equivalent (CDE)
      1) Compare the release duration "Total CDE" against dose values in EALs RG1.2 and RS.1.2 for classification.
5. Print the Atmosphere Steam Release page and the Dose Calculations page.
6. Enter the Assessors name at the top of each page.
7. Submit the calculation to the ISEC for approval. Signature on each page.